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Cover: Northern Saw-whet Owl (*Aegolius acadicus*). Baltimore County, Maryland, 4 March 2006. Photographed by Bill Hubick.

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EDITOR'S NOTE

The fall 2022 issue of *Maryland Birdlife* features an interesting array of articles. The issue starts with Jan G. Reese's summary of King Eider (*Somateria spectabilis*) records for the Chesapeake Bay. Next, Glenn D. Therres speculates whether there were Northern Saw-whet Owls (*Aegolius acadicus*) historically nesting at the White House in Washington, District of Columbia. Then, Wen S. Lin apparently solves the mystery of "pale-billed" American Crows (*Corvus brachyrhynchos*) that were present in Silver Spring, Maryland in 2021. Andrew M. Wilson presents an in-depth report of nocturnal bird migration over Frederick, Maryland during the 2021 spring and fall migration. John B. (J.B.) Churchill summarizes the Maryland Christmas Bird Counts from December 2021 through January 2022 and Ikumi Kayama chronicles the 2022 Maryland Mid-winter Bird Count. Lastly, Sue A. Riccardi recounts the 2022 spring raptor migration at Fort Smallwood Park, in Anne Arundel County, Maryland

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King Eider (*Somateria spectabilis*) Occurrence Records in Chesapeake Bay

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Abstract: King Eider (*Somateria spectabilis*) historical records indicate it is rare in the lower Chesapeake Bay, casual in open water of major tributaries, while not occurring in upper tributary portions. This study reviews various collection inventory databases and publications ranging 1866–2020 to compile, for evaluation, King Eider occurrence records in Chesapeake Bay. Records suitable for analysis total 90 of which 81% fall in the period 9 November–3 March, and 79% involve a single eider. Locations in the lower third of Chesapeake Bay (south of Tangier Island) comprise 53% of the occurrence records. National Audubon Society, Christmas Bird Counts constitute 31% of the records. The records providing age during the November–March period give 10% as immature plumage and 8% as adult, while records providing sex give 21% as female and 13% as male. The warm-weather records (20 May–3 October) providing age denote 12% as immature plumage and 3% as adult while records providing sex show 6% female. Single eider constitute all except one of the 17 warm-weather records with most exhibiting immature plumage being found at the same location for four consecutive weeks or more while appearing to be flightless. Detection and identification of immature or female plumage (juvenile, sub-adult) King Eider may be difficult and present uncertainties especially when viewing at a distance, under poor light or spray conditions, rough seas, or mixing with similar appearing scoter species. King Eider occurrence in Chesapeake Bay may be more frequent than records indicate considering the number of incidences found despite their rare and casual classifications, plus identification difficulties with female and/or immature plumages.

Keywords: Chesapeake Bay, immature plumages, King Eider, occurrence records, *Somateria spectabilis*.

The circumpolar species King Eider (*Somateria spectabilis*) winter at sea in large flocks near the southern limit of pack ice. Hatching-year birds remain at sea their first year while some wintering individuals in the western Atlantic Ocean may sometimes migrate farther south along rocky coast lines or those shielded with rock riprap south to Florida (Worthington 1890, Bent 1925, Griscom 1925, Kortright 1953, Owre 1962, Powell and Suydam 2020).

Historical literature considers King Eider a rare local transient and winter resident in the lower portion of Chesapeake Bay (Larner 1979, Kain 1987,

Rottenborn and Brinkley 2007), casual in tributary open waters of the Potomac River north (Hampe and Kolb 1947, Stewart and Robbins 1958), while it appears to not occur in upper tributary reaches of eastern and western Chesapeake Bay (Stewart and Robbins 1958, Hess et al. 2000). A paucity of identifications at Chesapeake Bay latitudes equates to little known about the occurrence status of this northern species within the largest tributary in North America.

This study reviews various literature sources to compile a dataset of records for evaluation of King Eider occurrence in Chesapeake Bay tidewater west and north of Cape Henry/Kiptopeke (Fisherman Island National Wildlife Refuge).

METHODS

A literature review for 1866–2020 King Eider occurrence records provided in jurisdictional records committee databases, bird collection inventories, regional reference books, and regional bird organization periodic journals (Table 1) furnished a database of records for evaluation and analysis. Additionally, included are a few records taken from articles published in national periodic ornithological journals referenced in the Literature Cited herein. Records posted on eBird are not included since almost all the inclusive years in this study precede the evolution of eBird that in initial years received no identification confirming oversight. Furthermore, field records in this study came from records committee submissions and/or publications. Individual definitive records (i.e., date, location, quantity, age, sex, observer, etc.) manually located in the sources and entered on a Microsoft Excel workbook spreadsheet allowed filtering and sorting for evaluation by individual variable(s).

RESULTS

The literature review found 104 King Eider occurrence records. Editing of individual records noted nine at the same location on the same date and/or during contiguous dates of eider occurrence at that location (i.e., some records that were likely repeated observations of the same individual), three seen on a lake or reservoir, and the exact location could not be certain for two others. Deletion of these 14 records left 90 records for evaluation. Table 2 summarizes evaluation analysis of the 90 Chesapeake Bay occurrence records.

In Chesapeake Bay, 70% of the King Eider records took place during the period 1980–2018 while April is the only month lacking records. Increasingly, the number of records went from 10 during the 2000s decade to 23 during the 2010s.

Single eider observations comprise all 17 warm-weather occurrence records during 20 May–3 October with the exception of a group of three (male, female, and an immature) occurring at Grandview, Hampton during the period 26 May–11 July 1974.

Table 1. Sources of King Eider occurrence records in Chesapeake Bay.

Records Committee Database Updates
Maryland/DC Records Committee (from inception through 29 January 2021) https://mdbirds.org/wp-content/uploads/md-records-database.pdf
Virginia Avian Records Committee (from inception through March 2021) http://vsodoves.org/submissions
Museum Bird Collection Databases
American Museum of Natural History https://www.amnh.org/research/vertebrate-zoology/ornithology/database Accessed 8 April 2021
The Academy of Natural Sciences of Drexel University http://clade.ansp.org/ornithology Accessed 8 April 2021
US National Museum of Natural History https://collections.nmnh.si.edu/search/birds/ Accessed 8 April 2021
Inventories of Multiple Bird Collection Databases
Arctos Collections http://arctos.database.museum/home.cfm Accessed 15 May 2020
VertNet http://vertnet.org/ Accessed 17 February 2021
Regional Reference Publications
Maryland Hampe and Kolb (1947) Stewart and Robbins (1958)
Virginia Murray (1952) Larner (1979) Kain (1987) Rottenborn and Brinkley (2007)
Regional Periodic Bird Journals
Maryland Birdlife: 1945 Vol. 1(1)–2005 Vol. 61(3–4)
The Raven: 1950 Vol. 21(1–2)–2020 Vol. 91(1)
The Maryland Yellowthroat: 2004 Vol. 24(1)–2017 Vol. 37(2)
Virginia Birds: 2004 Vol. 1(1)–2020 Vol. 16(4)

Table 2. Analysis of King Eider occurrence records in Chesapeake Bay.

Values based on a total of 90 occurrence records	n (sample size)	%
Occurrence records during 1866–2020		
Years with occurrence records (based on 154 years 1866–2020)	48	31
Years with most occurrence records: 2010	8	9
1997	5	6
Occurrence records general distribution in Chesapeake Bay		
South of Tangier Island	48	53
Tangier Island to Tilghman Island	21	23
Tilghman Island to mouth of Susquehanna River	21	23
Periods of occurrence		
Migration/wintering/migration (9 November–3 March)	73	81
Warm-weather (20 May–3 October)	17	19
Months with most migrating/wintering occurrence records		
November	15	17
December	37	41
January	10	11
Individual occurrence record quantities		
1 eider	71	79
2 eider	9	10
3–4 eider	4	4
6–9 eider	4	4
>10 eider	2	2
Duration of occurrence record		
1 day	74	82
1 week	4	4
2 weeks	3	3
3 weeks	2	2
4 weeks	2	2
5 weeks	1	1
6 weeks	2	2
>10 weeks	2	2
Occurrence records providing age		
Not determined	60	67
Immature plumage (juvenile/sub-adult)	20	22
Adult plumage	10	11
Immature plumage among migration/wintering/migration	9	10
Adult plumage among migration/wintering/migration	7	8
Immature plumage among warm-weather	11	12
Adult plumage among warm-weather	3	3
Occurrence records providing sex		
Not determined	49	54
Female	24	27
Male	17	19
Female plumage among migration/wintering/migration	19	21
Male plumage among migration/wintering/migration	12	13
Female plumage among warm-weather	5	6
Male plumage among warm-weather	5	6
Disposition of occurrence record		
Visual field identification	76	84
Physical specimens shot by hunters	7	8
Physical specimens shot for museum collections	7	8

Most occurrence records involve a single eider (79%); however, groups of three or more (3–21) occur ten times with eight occurring in close proximity to the mouth of Chesapeake Bay, e.g., Nansemond River, Hampton, Norfolk, Little Creek, Chesapeake Bay Bridge-Tunnel, and Cape Charles. Sandy Point State Park near Annapolis provides two other group occurrences.

DISCUSSION

King Eider occurrence record dates along the Atlantic Coast at latitudes paralleling east of Chesapeake Bay, include every month of the year (Stewart and Robbins 1958, Walsh et al. 1999, Hess et al. 2000, Rottenborn and Brinkley 2007) despite no historical April dates among Chesapeake Bay occurrence records.

Public access roadways to viewing vantage points and constantly growing birdwatcher numbers, field guide improvements in identification methods, portable wireless communications and digital media availability, and optic and camera technical advancements may be responsible for a progressive and substantial increase in the number of King Eider occurrence records in Chesapeake Bay during the past two decades.

King Eider begin moving away from their Arctic breeding areas to molting areas in mid-August–October with most gone by the end of September, and subsequently from molting areas to wintering areas where they generally arrive in late-November–early-December. Eider migrant or wintering areas may freely change at any time. Date, latitude, location of sea ice, individual behavior and possibly food availability may fuel this restlessness (Oppel et al. 2008, Oppel et al. 2009, Powell and Suydam 2020). Thus, with variable timing of these events among individuals categorizing eider occurrences as migrant or wintering at Chesapeake Bay latitudes becomes questionable. These behaviors and timing events may explain why 41% of the Chesapeake Bay occurrence records are in December (Table 2).

Hatching-year (juvenile plumage) King Eider may remain in wintering areas through June–July (Oppel and Powell 2010, Schamber et al. 2010). This factor may explain the 17 warm-weather occurrences in this study, plus others occurring along the paralleling Atlantic Coast of New Jersey, Delaware, and Virginia (Larner 1979, Kain 1987, Walsh et al. 1999, Hess et al. 2000, Rottenborn and Brinkley 2007).

Figure 1 shows the number of King Eider occurrence records at various locations throughout Chesapeake Bay. The largest portion of records (53%) occur in the lower third of Chesapeake Bay (Table 2). A large percentage of the records are expected in this area since eider are primarily an oceanic maritime

species (Kortright 1953, Bellrose 1980) sometimes found wintering along the east coast of North America. Additionally, opening in April 1964 of a bridge-tunnel through the interface of the Atlantic Ocean with the Chesapeake Bay

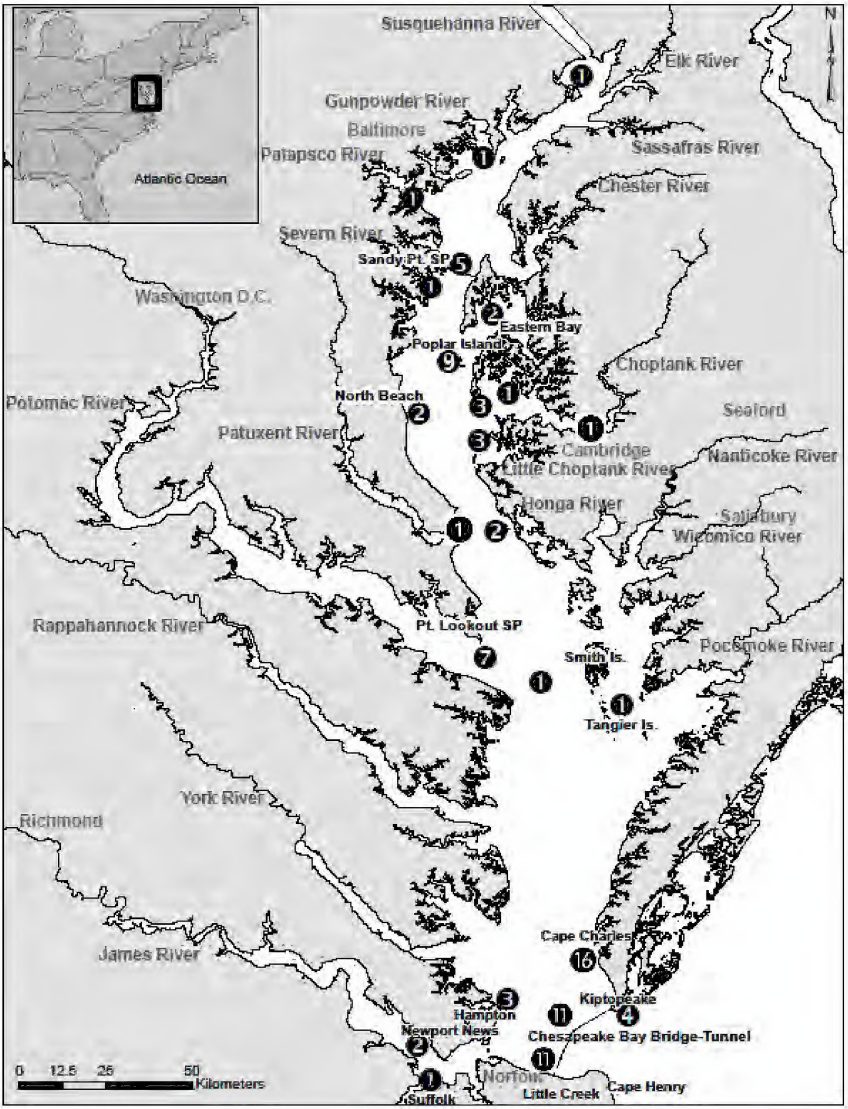

Figure 1. King Eider number of occurrence records at Chesapeake Bay locations.

tributary provided a few birdwatching lookouts along its route. These facts may be responsible for 29% (26 records) of all occurrence records being made from just three locations along the bridge-tunnel route (Figure 1). Other record locations extend north to Susquehanna Flats at the head of the Bay. Broad, open, and deep portions of the Chesapeake Bay tributary and/or such areas with riprap shielding along shorelines characterize the habitat of most occurrence records. For example, these include records made from popular public access viewing locations on the Chesapeake Bay Bridge-Tunnel islands with shoreline riprap shielding, Grandview Nature Preserve in Hampton, Cape Charles Fishing Pier, Point Lookout State Park at the mouth of Potomac River, and Sandy Point State Park near Annapolis. A few occurrence records however come from locations with much shorter open water fetch distances such as Suffolk, Nansemond River, and Newport News in the James River tributary; Cambridge Harbor and the mouth of Broad Creek (Reese 1968) northwest of there in the Choptank River tributary; and the mouth of Cox Creek in Eastern Bay (Reese 1968). Several literature sources note King Eider association with deep offshore waters (Bent 1925, Pough 1951, Kortright 1953, Bellrose 1980), while another relates their affinity to breakwaters, jetties, and shorelines with rip-rap shielding along the nearby New Jersey coast (Walsh et al. 1999).

Predominance of single-eider occurrence records and rarity of a larger number also occur along the Atlantic Coast of New Jersey, Delaware, Maryland, and Virginia paralleling the Chesapeake Bay (Murray 1952, Stewart and Robbins 1958, Larner 1979, Kain 1987, Walsh et al. 1999, Hess et al. 2000, Rottenborn and Brinkley 2007).

A duration period of two days to three weeks defines nine (10%) individual King Eider migrating/wintering occurrence records (Table 2). Much longer duration periods of four to 21 weeks characterizes five (29%) of six warm-weather records (17). Juvenile or immature plumage characterizes warm-weather eider occurrences, while all appear incapable of flight perhaps due to infliction, injury, or molt issues (Reese 1968).

Adult King Eider, particularly males, are seldom found at Chesapeake Bay latitudes suggesting they may winter further north than eider with pre-adult (juvenile, immature) or female plumage (Bent 1925, Rottenborn and Brinkley 2007). The 50% fewer eider occurrence records with adult plumage than those with pre-adult plumage, and 8% fewer male than female plumages in this study lend support to that hypothesis (Table 2).

King Eider with pre-adult plumage (juvenile, immature), especially females present difficulties and uncertainty with identification (Pough 1951, Kortright 1953, Reese 1968, Bellrose 1980, Hess et al. 2000, Pyle 2008). The identification uncertainties may attest to 67% of the Chesapeake Bay occurrence

records withholding an age and 54% lacking identification of sex (Table 2). Identification of eider with pre-adult plumages presents a challenge despite close-in viewing, while subjects over 100 m (328+ ft) away become even more problematic. Rough seas with spray, precipitation, or poor light may exacerbate identification difficulties, even with a spotting scope, while one or a few individuals mixed in a flock of scoters (*Melanitta* spp.) may go unseen.

National Audubon Society annual Christmas Counts provide 28 (31%) King Eider occurrence records for the Chesapeake Bay with 12 (43%) of those from the Chesapeake Bay Bridge-Tunnel (2) and Little Creek (10) counts which both include a portion of the Chesapeake Bay Bridge-Tunnel across the mouth of the Chesapeake Bay. Other Christmas Count eider occurrences include Cape Charles (11), Newport News (2), and singles from Suffolk, Point Lookout State Park, and Sandy Point State Park. Names of participants identifying eider during Christmas Counts are generally not given in the literature, however observers are given for most of the remaining 62 occurrence records.

Locations in the Chesapeake Bay providing five or more occurrence records find prominent among the observers: Robert Ake and Robert Anderson in the Little Creek/Chesapeake Bay Bridge-Tunnel area, Edward Brinkley in the Cape Charles/Chesapeake Bay Bridge-Tunnel areas, Patricia Craig at Point Lookout State Park, Jan Reese at Poplar Island, and Harold Wierenga at Sandy Point State Park. Figure 1 gives the number of eider occurrence records at each Chesapeake Bay location while highlighting vantage points to watch out for this difficult-to-identify duck in pre-adult plumages.

Occurrence of King Eider in Chesapeake Bay may be more frequent than existing records indicate considering publicly inaccessible land-based vantage points and offshore habitats they most frequent, plus difficulty with identification of pre-adult plumages. Continuously expanding land development and human populations in the Chesapeake Bay Coastal Plain may in the coming years serendipitously facilitate learning more about the status of this species in the country's largest estuary.

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I praise the Virginia Society of Ornithology, The Center for Conservation Biology at William and Mary, and the Maryland Ornithological Society for investing in compilation PDF scans of historical issues of their journals *The Raven*, *Virginia Birds*, and *Maryland Birdlife*. Similarly, the Virginia Avian Records Committee (VARCOM) and Maryland/District of Columbia Records Committee (MD/DCRC) provide publications and/or websites that give historical occurrences of unusual species submitted for identification review. Also, at various websites there are both collective and individual institutional

bird collection inventories. Digital preservation or offering at all these resources, made available free to the public, is a valuable resource tool for researchers and historians. Appreciation is given Jeffery D. Sullivan for composition of Figure 1.

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Were There Northern Saw-whet Owls (*Aegolius acadicus*) Nesting at the White House?

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While reading a book about President Theodore Roosevelt and his life-long interest in natural history, including collecting specimens for museums, I found a reference to Northern Saw-whet Owls (*Aegolius acadicus*) observed by the President during a number of hot June evenings at the White House (Lunde 2016), located at 1600 Pennsylvania Avenue NW in Washington, District of Columbia.

The source of that information came from a book President Roosevelt wrote (Roosevelt 1905). The final chapter of the book was about the variety of birds, mostly songbirds, that the President had observed at his homes in New York and Washington, D.C. His account of the Northern Saw-whet Owls was as follows:

> "This June two new guests came to the White House in the shape of two little saw-whet owls; little bits of fellows, with round heads, and no head tufts, or "ears." I think they were young of the year; they never uttered the saw-whet owl sound, but made soft snoring noises. They always appeared after nightfall, when we were sitting on the south porch, in the warm, starlit darkness. They were fearless and unsuspicious. Sometimes they flew noiselessly to and fro, and seemingly caught big insects on the wing. At other times they would perch on the iron awning-bars, directly overhead. Once one of them perched over one of the windows, and sat motionless, looking exactly like an owl of Pallas Athene" (Roosevelt 1905).

In Greek mythology, Pallas Athene was the daughter of Zeus. She was the guardian of cities, war goddess, patroness of arts and crafts, and promoter of wisdom. The Little Owl (*Athene noctua*) was her special bird, a symbol of wisdom (Van Nieuwenhuyse et al. 2008). This European owl is a rather small (23–25.5 cm [9–10 in]) and compact owl with a large rounded head, long legs and short tail (Svensson et al. 2009). It resembles North America's Burrowing Owl (*Athene cunicularia*), to which the Little Owl is closely related.

My first thought was the President misidentified the owls at the White House. Earlier in that same chapter, Roosevelt (1905) discussed Eastern Screech-Owls (*Megascops asio*) as follows:

> "It is a pity the little eared owl is called the screech-owl. Its tremulous, quavering cry is not a screech at all, and has an attraction of its own. These little owls come up to the house (on Long Island, New York) after dark, and are fond of sitting on the elk antlers over the gable. When the moon is up, by choosing one's position, the little owl appears in sharp outline against the bright disk, seated on his many-tined perch."

Since the President was familiar with Eastern Screech-Owls, it is unlikely the owls he described at the White House were this species.

Perhaps, the President actually saw Barn Owls (*Tyto alba*) instead. Barn Owls nested in Washington in the late 1800s (Coues and Prentiss 1883, Bendire 1895). However, a Barn Owl is more than twice the size of a Northern Saw-whet Owl and the President was a competent observer of birds. He also had some familiarity with the species as he had received a Barn Owl from the Emperor of Ethiopia along with several other specimens of birds, mammals, and reptiles (Roosevelt 1905). However, one of the calls of young Barn Owls was described in Bent (1938) as a short rasping call or "snore" that varies in pitch.

President Theodore Roosevelt was an ardent naturalist and competent birdwatcher as pointed out by Lunde (2016). He published a list of summer birds of the Adirondacks (Roosevelt and Minot 1877) when he was only eighteen years old. He published other books and articles about natural history and hunting. Over the course of his lifetime, he provided many bird and mammal specimens to the Smithsonian Institution (Lunde 2016), including their proper identification. Perhaps President Roosevelt did see two Northern Saw-whet Owls at the White House in June 1905, but it is more likely that he misidentified the species.

Coues and Prentiss (1883) did not report Saw-whet Owls in the District of Columbia, but did list Barn Owl and Screech-Owl as occurring there. They reported that Barn Owls were occasionally seen or heard in the city, while they claimed that the Screech-Owl was the most abundant and smallest of the owls that occurred in Washington. They also stated that the Short-eared Owl (*Asio flammeus*) was abundant, even having been taken (collected) in the streets of the city.

Webster (1887) reported a few Saw-whet Owls found in the District of Columbia during the fall of 1887. These were found in trees on farms within the District's limits. Hasbrouck (1891) reported a few were found during the winter of 1891 in the District, including one that flew into the Smithsonian building. Most of the owls were found in a dense thicket of pines, *Pinus* L. sp. (Pinaceae).

Cooke (1929) reported Saw-whet Owl as an occasional winter visitant to the Washington, D.C. area. She listed no summer records for this species. She also

reported Short-eared Owl as a rare winter visitor. Barn Owl was reported as an uncommon permanent resident and Screech-Owl as a fairly common permanent resident.

Stewart and Robbins (1958) acknowledged that Saw-whet Owls occurred in the District of Columbia as a transient, with the earliest recorded arrival date of 3 October 1886. They reported definite breeding records of Barn Owls in the District.

The breeding range of the Northern Saw-whet Owl is primarily the boreal and northern hardwood forest zones of North America along the United States and Canadian border, the Rocky Mountain region, and along the Pacific coast (Rasmussen et al. 2020). Breeding also is scattered in the Appalachian Mountains, including Maryland, but has never been documented in the District of Columbia.

The first evidence of possible breeding in Maryland occurred in 1903 when a juvenile bird was captured near Cumberland in Allegany County (Eifrig 1904). Stewart and Robbins (1958) mentioned summer records at three swamps in Garrett County, but had no other evidence of breeding. They also reported an individual occurred in Baltimore County on the unusual date of 24 June 1921.

The first confirmed nesting of Northern Saw-whet Owls in Maryland occurred in April 1993 at Cranesville Swamp in Garrett County (Brinker and Dodge 1993). Through 2008, another nine nests were recorded in that county (Brinker 2010). This species has not been found nesting anywhere else in Maryland, though a juvenile was photographed on Catoctin Mountain in Frederick County.

Nesting of Northern Saw-whet Owls in the surrounding states of Pennsylvania, Virginia, and West Virginia are also in the mountains. In Pennsylvania, the species is rare but scattered throughout the state (Gross 1992). It was recorded in 92 atlas blocks during the 7-year breeding bird atlas project. Saw-whets were recorded in only four blocks during the West Virginia atlas, but its remote breeding range and nocturnal habits prevented it from being detected elsewhere (Buckelew and Hall 1994). Most of the West Virginia records were at high elevations. However, Edeburn (1968) documented immature Saw-whet Owls in West Virginia at an altitude of between 198 and 213 m (650 and 700 ft) in the lower Ohio River valley.

The first documented nesting of Northern Saw-whet Owls in Virginia was in 1995 when an active nest was found in a nest box for Northern Flying Squirrels (*Glaucomys sabrinus*) in the mountains of Highland County (Pagels and Baker 1997). Since then, adult Saw-whets have been detected in several mountainous counties in Virginia from mid-April through early June (Dolby and Mellinger 2006).

Breeding habitat is a variety of forest types, both coniferous and deciduous (Rasmussen et al. 2020). In the Appalachian Mountains, it nests primarily in coniferous forests. These small owls use forests with dense understory vegetation such as conifer swamps, alder wetlands, areas of dense hemlock, or hardwood forests with thick understories that offers protection from larger owls (Brinker 2010).

In Maryland, eggs dates have ranged from mid-April through May (Brinker 2010). Chicks in nests have occurred from mid-May through June. Egg dates in Virginia were slightly earlier than Maryland's. Pagels and Baker (1997) found eggs in a nest box in Highland County in mid-March and another clutch in late March in Russell County, both in the mountains. Fledging in Maryland begins in late May and the young are dependent on their parents for food for at least a month thereafter (Brinker 2010). In Pennsylvania, fledglings were observed from the end of May until mid-July (Gross 1992).

No data are available on dispersal of post-fledging Northern Saw-whet Owls, though Rasmussen et al. (2020) estimated independence from adults was probably within 6 to 8 weeks of fledging. Post-fledging dispersal of other small owls usually occurs 45 to 60 days after fledging (Belthoff and Ritchison 1989, King and Belthoff 2001, Pedersen et al. 2013). If fledgling Northern Saw-whet Owls disperse within a similar time period, the ones at the White House would have been produced locally given the fledging dates of surrounding states. Those young would have still been in their natal territory.

Though the timing of President Roosevelt's observation of two young owls at the White House is within the period of fledged Northern Saw-whet Owls in Maryland and elsewhere, the habitat at the White House is not typical, though there were likely some coniferous trees as part of the landscape. Given what is known about the breeding distribution and habitat of Northern Saw-whet Owls, it is unlikely that the little owls seen by President Roosevelt at the White House were Saw-whets. Or were they?

David Brinker (in litt., 27 March 2022), Maryland's leading authority on Northern Saw-whet Owls, believes that it is possible those owls at the White House were Saw-whets. He believes during a cooler than usual summer, in a location with a cool microclimate, they might pull off a nesting event. But the normal hot summers of the Piedmont would cause sufficient thermal stress to preclude building a sustainable population. If we go back about 100 years to 1905, the summer climate in the mid-Atlantic was not as hot as it is today. It may have been cool enough in those years for a Northern Saw-whet Owl that had wintered in DC and found a good stable supply of mice to find a cavity, attract a female, and pull off a nesting event. Brinker believes if this occurred near the White House, it is very plausible that Roosevelt's identification was

correct and that this unusual nesting record is true. Northern Saw-whet Owls have difficulty thermo-regulating in temperatures above 37.8 °C (100 °F) (Ligon 1969). Inability to control body temperature during hot humid summer conditions limits this owl to generally cooler climates.

The usual nesting occurrences of Northern Saw-whet Owls outside of their normal breeding range suggests the White House owls may have been one of those extralimital nesting occurrences. Hollister (1908) reported a nest in a shade tree near a house in Indiana. Schaeffer (1968) recorded a nest with young on Long Island, New York in a wooden nest box. The nest was close to a salt marsh. L. H. MacIvor (in Brinker and Dodge 1993) found a nest in a utility pole in Massachusetts. These unusual locations where Northern Saw-whet Owls have been recorded as breeding suggest that D.C. in 1905 might not be that unlikely. Maybe somewhere around the White House was possible.

According to maps and old photos of Washington (Goode 2012), especially of Pennsylvania Avenue, the White House was surrounded by buildings of all sizes. The grounds of the White House appeared to have the only significant amount of vegetation in the area, except for the small trees along the city streets.

I would like to believe, given President Roosevelt's skills as a naturalist, with his keen interest in birds, that the owls he observed in the month of June at the White House were Northern Saw-whet Owls.

ACKNOWLEDGMENTS

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"Pale-billed" American Crows (*Corvus brachyrhynchos*) in Silver Spring, Maryland: The apparent entomological connection

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ABSTRACT: From 3 April through 9 May 2021, several observations of American Crows (*Corvus brachyrhynchos*) with pale bills were documented in the Sherwood Forest neighborhood of Silver Spring, Montgomery County, Maryland. Unlike other American Crows with typically black bills, these individuals exhibited bills with variable amounts of pale coloration and/or maculations. For some of the observations, the bill appeared somewhat dull yellowish. During the 37-day observation period, one to three crows were present simultaneously. The routine activities of these American Crows were concentrated in a small area of the neighborhood (within the boundary of Sherwood Forest Drive on the east, Randolph Road on the southeast, and Locksley Lane on the southwest). No American Crows with pale bills were observed after 9 May 2021, only breeding, black-billed American Crows. Coincidently, spring 2021 saw the emergence of the Brood X 17-year periodical cicadas, *Magicicada* Davis spp. (Hemiptera: Cicadidae), which apparently was correlated with the American Crow "pale-billed" condition.

On 3 April 2021, my wife Jya-Mei Lu and I were walking along a Sherwood Forest neighborhood street in the vicinity of the Robin Hood Swim and Dive Club, 225 Mowbray Road, Silver Spring, Montgomery County, Maryland. At approximately 3:00 p.m., we initially observed a Red-shouldered Hawk (*Buteo lineatus*) perched atop a chain link fence. We were approximately 21–24 m (70–80 ft) from the hawk and observed it through binoculars. We moved a little closer to photograph the hawk. Subsequently, we noticed a crow (*Corvus* sp.) perched about 1 m (3 ft) near the hawk. My wife took a few photos of the birds with her SONY DSC-HX99 point and shoot camera. The weather was sunny and the sun's angle was approximately at the 10–11 o'clock direction as we faced the birds. The crow exhibited no interactions with the Red-shouldered Hawk and the crow never vocalized. After about 10 seconds, the crow took flight while the hawk remained perched. Later when we examined the photos, we noticed that the crow had a pale, somewhat dull yellowish bill (Figures 1 and 2).

The observed bird resembled a typical crow in appearance and behavior except for the aberrantly colored bill. Dunn and Alderfer (2017), show seven *Corvus* species occurring in North America, none of which have pale bills. Due to

Figure 1. A "pale-billed" American Crow (*Corvus brachyrhynchos*) perched atop a fence near a Red-Shouldered Hawk (*Buteo lineatus*). Silver Spring, Montgomery County, Maryland; 3 April 2021; DSC00361 photographed by Jya-Mei Lu.

Figure 2. A "pale-billed" American Crow in flight. Silver Spring, Montgomery County, Maryland; 3 April 2021; DSC00362 photographed by Jya-Mei Lu.

lumping of two of the species, that number was reduced to six on the American Ornithological Society 2020 checklist (Chesser et al. 2020). Of the six corvids, three are crows. Of the three crows, only two occur in the Mid-Atlantic region: American Crow (*Corvus brachyrhynchos*) and Fish Crow (*Corvus ossifragus*). Since the crow never vocalized on 3 April 2021, we could not determine with certainty if the bird was an American Crow or a Fish Crow. The plumage was not pitch black but had some light gray-bluish color, possibly due to reflection of the sunlight. The crow that we observed was not a fledgling based on its fully-feathered plumage (i.e., no downy feathers, no brownish feathers, and the presence of long remiges and rectrices), dark irides (i.e., not steel gray to blue, turning gray as in hatchling and fledgling American Crows [Verbeek and Caffrey 2021] and not grayish-blue, turning light neutral gray to glaucous before fledging in Fish Crows [McGowan 2020]), and the absence of a fleshy gape.

The Birds of the World entry for American Crow states that hatchlings have a pale, fleshy pink bill; post-fledglings have a black-tipped bill; late summer birds show darkening near the tip and along the edges of the bill; and adults have glossy black bills (Verbeek and Caffrey 2021). The entry for Fish Crow states that their bills start as light neutral gray, turning blackish neutral gray to jet black by week three (McGowan 2020). Neither reference mentions any instances of pale or dull yellowish bills in adults.

Searches using Google Scholar and Google yielded no mention of adult crows with pale or dull yellowish bills. Crows.net showed a photograph of a fledgling and stated "The fledgling [American Crow] differs from an adult crow in that it has [some] yellow coloration on its bill…" (Westerfield 1999–2011). Again, the bird I observed was not a fledging

Additionally, I forwarded the photographs to Jay M. Sheppard for his opinion. He forwarded these photographs to Kevin J. McGowan (Senior Course Developer and Instructor, Bird Academy, The Cornell Lab of Ornithology, Ithaca, New York) whose expertise is crows. McGowan responded that he had never seen any crow with a [similarly-colored] bill (McGowan via Sheppard, in litt., 5 April 2021).

SUBSEQUENT OBSERVATIONS

On 6 April 2021, I observed a somewhat "pale-billed" crow from inside our house and managed to take one photo through the screen (Figure 3). The crow was consuming a periodical cicada nymph, *Magicicada* Davis sp. (Hemiptera: Cicadidae). The bill appeared to be somewhat pale with dark maculations. This observation would be more significant than was apparent at the time.

Subsequently on 9 April 2021, around 3:00 p.m., I observed a "pale-billed" crow on a high conifer branch near my house. Unfortunately, I only had binoculars

with me at the time. Subsequently, I walked around the neighborhood with my camera until 4:15 p.m. and photographed a crow with a mostly pale bill but with darker maculations (Figure 4). The pattern of maculations on this bill appeared to differ from those seen in the previous two observations. At the time, only American Crow vocalizations were heard from the overall crow flock.

On 10 April 2021, I had a fourth observation of a crow with a mostly pale bill with some darker maculations (Figure 5). The pattern of maculations on this bill appeared to differ from those of previous observations. At the time, only American Crow vocalizations were heard from the overall crow flock.

On 11 April 2021, I spotted two individual crows with mostly pale bills with darker maculations (Figures 6 and 7). The pattern of maculations on these two bills differed from any previous observations. Again, at the time, only American Crow vocalizations were heard from the overall crow flock.

On 12 April 2021, I had a seventh observation of a crow with a mostly pale bill with darker maculations (Figure 8). Again, the pattern of maculations on the bill appeared to differ from previously seen bills. Again, at the time, only American Crow vocalizations were heard from the overall crow flock.

On 17 April, 2021, my wife spotted two "pale-billed" crows on a Mowbray Road roadside lawn around 6:15 p.m. The two flew and perched atop a chain link fence by the Robin Hood Swim and Dive Club tennis court. She saw another one on the ground of the tennis court. I took a few photographs (Figure 9) of the two crows on the fence and tried to get closer. The crow perching on the right flew and landed on a tree branch in the backyard of a house on Beaumont Road. A few second later, the crow perching on the left flew to the same backyard and landed in a different tree. A third crow with the palest bill also flew and joined the second crow on the branch. The two had some interactions and I photographed the two with their bills point-to-point (Figure 10). A few minutes later, all three landed on the ground and out of my view. Eventually, one by one, all three took off and flew toward the southeast. These three crows seemed to form a group. I recalled the second time I presumably observed a palest-billed crow, there were also two additional "pale-billed" crows, all flying and chasing each other. Again, at the time, only American Crow vocalizations were heard from the overall crow flock.

There were several observations of crows with pale bills subsequent to 17 April 2021 (Table 1): 20 April 2021 (1); 22 April 2021 (1); 23 April 2021 (1); 23 April 2021 (2); 25 April 2021 (1); 26 April 2021 (1); 26 April 2021 (1); 27 April 2021 (1); 27 April 2021 (1); 30 April 2021 (1); 1 May 2021 (1); 5 May 2021 (2); 6 May 2021 (1); 6 May 2021 (2); 6 May 2021 (1); 8 May 2021 (1); and 9 May 2021 (1). There were no observations of crows with pale bills after 9 May 2021.

Figure 3. A second observation of an American Crow exhibiting a somewhat pale bill with dark maculations, and a captured periodical cicada nymph, *Magicicada* Davis sp. (Hemiptera: Cicadidae) in its bill. Silver Spring, Montgomery County, Maryland; 6 April 2021; DSC03586 photographed through a screen by Wen S. Lin. (This is a significant, albeit somewhat blurry, image.)

Figure 4. A third observation of an American Crow with a mostly pale bill. Silver Spring, Montgomery County, Maryland; 9 April 2021; DSC03616 photographed by Wen S. Lin.

Figure 5. A fourth observation of an American Crow with a mostly pale bill. Silver Spring, Montgomery County, Maryland; 10 April 2021; DSC03732 photographed by Wen S. Lin.

Figure 6. A fifth observation of an American Crow with a mostly pale bill. Silver Spring, Montgomery County, Maryland; 11 April 2021; DSC03824 photographed by Wen S. Lin.

Figure 7. A sixth observation of an American Crow with a mostly pale bill. Silver Spring, Montgomery County, Maryland; 11 April 2021; DSC03854 photographed by Wen S. Lin.

Figure 8. A seventh observation of an American Crow with a mostly pale bill. Silver Spring, Montgomery County, Maryland; 12 April 2021; DSC03908 photographed by Wen S. Lin.

Figure 9. American Crows with pale bills; perched side-by-side. Silver Spring, Montgomery County, Maryland; 17 April 2021; DSC04231 photographed by Wen S. Lin.

Figure 10. American Crows with pale bills; perched touching bills. Silver Spring, Montgomery County, Maryland; 17 April 2021; photographed by Wen S. Lin.

Table 1: Observational summary of American Crows with pale bills in the Sherwood Forest neighborhood of Silver Spring, Maryland, 3 April–9 May 2021.

Date	Number Observed	Location	Photo	Figure
3 Apr	1	near 225 Mowbray Road	DSC00361, DSC00362	1, 12A 2
6 Apr	1	13320 Tamworth Lane	DSC03586	3, 12A
9 Apr	1	13319 Tamworth Lane backyard	DSC03616	4, 12A
10 Apr	1	125 Beaumont Road backyard	DSC03732	5, 12A
11 Apr	2	201 Mowbray Road	DSC03824,	6, 12A
		207 Mowbray Road	DSC03854	7, 12A
12 Apr	1	Open area between 207 Mowbray Road and 225 Mowbray Road	DSC03907, DSC03908	– 8, 12B
17 Apr	3	near 225 Mowbray Road and in a backyard of 208 Beaumont Road	DSC04231, DSC04236, DSC04253, DSC04261, DSC04265	9, 12B 12B – – –
20 Apr	1	125 Beaumont Road backyard	DSC04350	–
22 Apr	1	13319 Tamworth Lane front yard	DSC04394	–
23 Apr	1	204 Mowbray Road front yard	DSC04432	12B
23 Apr	2	201 Mowbray Road	DSC04469, DSC04477	12B
25 Apr	1	13323 Tamworth Lane front yard	DSC04479	12B
26 Apr	1	220 Mowbray Road	DSC04494	12C
26 Apr	1	200 Beaumont Road	DSC04508	–
27 Apr	1	13319 Tamworth Lane	DSC04516, DSC04524	– –
27 Apr	1	13320 Tamworth Lane	DSC04536, DSC04537	– –
30 Apr	1	13320 Tamworth Lane	DSC04737	12C
1 May	1	in a tall tree top behind 201 Beaumont Road	DSC04847	–
5 May	2	200 Beaumont Road	DSC05012, DSC05013, DSC05053	– – –
6 May	1	201 Mowbray Road	DSC05100	–
6 May	2	200 Beaumont Road	DSC05116-1, DSC05131	– 12C
6 May	1	125 Beaumont Road	DSC05142	12C
8 May	1	129 and 201 Beaumont Road	DSC05199, DSC05204, DSC05211	– – 12C
9 May	1	between 201 Mowbray Road and 200 Beaumont Road	DSC05237	12C

Figure 11 shows the spatial distribution of the observations of "pale-billed" American Crows clustered around Beaumont Road, Mowbray Road, and Tamworth Lane from 3 April 2021 through 9 May 2021.

Figure 11. Geographic distribution of the various American Crows with pale bills. Stars indicate where the crows were observed. (Google Maps 2021; © Commonwealth of Virginia, Maxar Technologies, United States Geological Survey).

A closeup comparison of some of the pale bills photographed over the 3 April–9 May 2021 period showed the variety of "pale-billed" patterns (Figures 12A, 12B, and 12C). Although lighting conditions, sunlight/shade, sun angle, bird orientation, etc. varied, the pale bills were easily observable. Some bills appeared to be mostly pale, others were mostly pale with some dark maculations, and some were only slightly pale with darker maculations.

Figure 12A. A comparison of several of the American Crows with pale bills. Top left: DSC00361 – 3 April 2021; Top right: DSC03586 – 6 April 2021; Middle left: DSC03616 – 9 April 2021; Middle right: DSC03732 10 April 2021; Bottom left: DSC03824 – 11 April 2021; Bottom right: DSC03854 – 11 April 2021. All photos: Silver Spring, Montgomery County, Maryland.

Figure 12B. A comparison of several of the American Crows with pale bills. Top left: DSC03908 – 12 April 2021; Top right: DSC04231 – 17 April 2021; Middle left: DSC04236 – 17 April 2021; Middle right: DSC04432 – 23 April 2021; Bottom left: DSC04477 – 23 April 2021; Bottom right: DSC04479 – 25 April 2021. All photos: Silver Spring, Montgomery County, Maryland.

Figure 12C. A comparison of several of the American Crows with pale bills. Top left: DSC04494 – 26 April 2021; Top right: DSC04737 – 30 April 2021; Middle left: DSC05131 – 6 May 2021; Middle right: DSC05142 – 6 May 2021; Bottom left: DSC05211 – 8 May 2021; Bottom right: DSC05237 – 9 May 2021. All photos: Silver Spring, Montgomery County, Maryland.

DISCUSSION

My initial impression was that there was a geographic cluster of genetically-mutated "pale-billed" American Crows living in my Sherwood Forest neighborhood but it was suspicious that there never were repeated sightings of any of the American Crow "pale-billed" patterns (Figures 12A, 12B, and 12C). It seemed unlikely that there wouldn't be repeated sightings of some of the same individuals.

The epiphany came from peer reviewer David J. Ziolkowski, Jr. (United States Geological Survey, Eastern Ecological Science Center, Laurel, Maryland; in litt., September 2021) who provided the following comments. He stated that the bill patterns were not the result of genetics but were instead due to the 2021 pre-emergence of the Brood X 17-year periodical cicada nymphs, *Magicicada* Davis spp. (Hemiptera: Cicadidae) that were still in their underground burrows. He also mentioned that some of the "pale-billed" American Crow photographs (particularly Figures 1 and 2) appeared to show the same abnormal coloration on the rictal bristles at the base of the bills. He mentioned that in April 2022, he had witnessed crows, Pileated Woodpeckers (*Dryocopus pileatus*), Blue Jays (*Cyanocitta cristata*), and other large-billed birds preying on periodical cicada nymphs and that nearly all the birds he observed doing this had the same thin veneer of dried mud/dirt on their bill as is visible in most of my photos. Therefore, the "pale-billed" American Crows resulted from a shift in their foraging strategy to utilize the abundant below-ground larder of periodical cicadas. He further stated that bird beaks can readily pick up a thin, shape-conforming film of mud/soil that can be observed in birds that frequently probe in soil. Northern Flickers (*Colaptes auratus*) readily show this soil veneer that typically dries into a light-colored, luminous film that could be misinterpreted as the bill's actual pigmentation.

Coincidently in 2021, Caleb M. Kriesberg documented the emergence of periodical cicadas in Silver Spring, approximately 8 km (5 mi) from the Sherwood Forest neighborhood (Kriesberg 2022). His first observance of any adult periodical cicadas in downtown Silver Spring occurred on 10 May 2021, coincidently the first day that American Crows with pale bills were no longer observed. This implied that the cicada nymphs were still within their underground burrows prior to that date. Hence, prior to 10 May, any animal wishing to feast on the nymphs needed to probe in the burrows where the not-yet-emerging nymphs were residing. After 10 May, numerous adult cicadas had emerged from their underground burrows and were easily accessible on lawns, shrubs, and trees. In 2021, Gabriel J. Foley (Coordinator of the third Maryland Breeding Bird Atlas) solicited observations of birds preying on Brood X periodical cicadas. He received 1,008 submittals and is currently analyzing the data for publication in a future issue of *Maryland Birdlife*. It seemed reasonable

to assume that prior to 10 May, the "pale-billed" American Crows had been probing the soil to capture periodical cicada nymphs and in the process were accumulating a soil film on their bills.

Figure 13 shows a soil map of Sherwood Forest where the American Crows with pale bills were observed (Soil Survey Staff 2022). The three soil types and their typical profiles are 1C—Gaila silt loam (surface layer: 0–20 cm [0–8 in] brown silt loam; subsoil: 20–43 cm [8–17 in] strong brown loam, 43–51 cm [17–20 in] yellowish brown loam); 5B—Glenville silt loam (surface layer: 0–20 cm [0–8 in] dark brown silt loam; subsoil: 20–51 cm [8–20 in] yellowish-brown gravelly silt loam with grayish-brown mottles); and 16D—Brinklow-Blocktown channery silt loams (Brinklow channery silt loams: surface layer: 0–25 cm [0–10 in] brown channery silt loam; subsoil: 25–64 cm [10–19 in] in strong brown channery silt loam; Blocktown channery silt loams: surface layer: 0–15 cm [0–6 in] yellowish-red channery silt loam; subsoil: 15–43 cm [6–17 in] red extremely channery silt loam) (USDA-NRCS 1995). Note that the colors of the surface layers are 1C brown, 5B dark brown, 16D (Brinklow) brown, and 16D (Blocktown) yellowish-red. Silt loams are composed of sand, silt, and clay. Fine clay particles could potentially coat a bird's bill with a somewhat pale film.

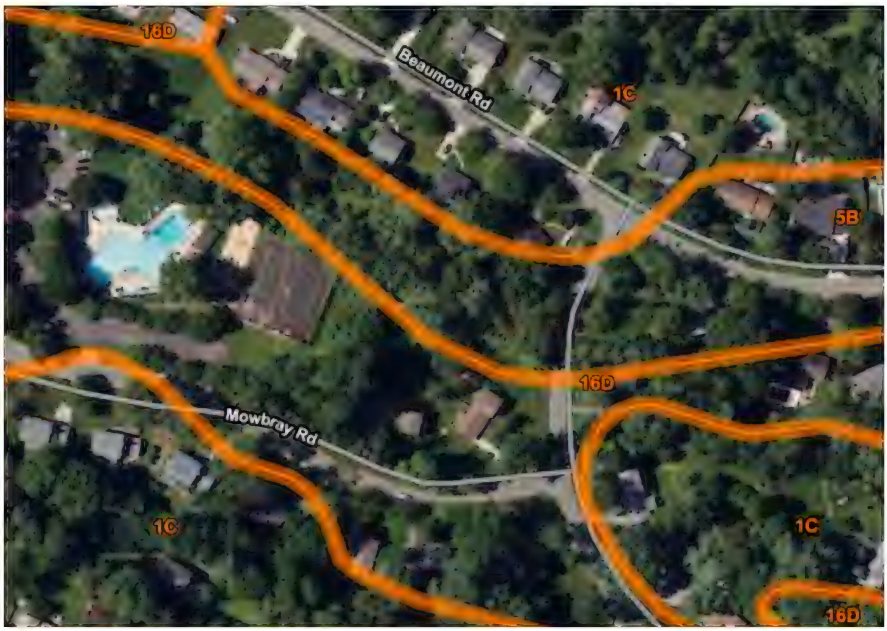

Figure 13. Soil map of the Sherwood Forest neighborhood where the American Crows with pale bills were observed. Created by Eugene J. Scarpulla using Web Soil Survey (Soil Survey Staff 2022).

Fortuitously, a utility company excavated an underground gas line, exposing the soil in one of the periodical cicada emergence areas in my front yard (Figure 14). The color appeared to be similar to that of the American Crows with pale bills.

Figure 14. Front yard of 13320 Tamworth Lane, Silver Spring showing the excavated clay that was immediately under the topsoil (result of a gas pipe replacement). The clay has a similar color to the American Crows with pale bills.

Additionally, in April and May 2022, I searched for American Crows with pale bills in the same locations as 2021. Only normal-looking American Crows with black bills were observed in this subsequent year, thereby lending more credence to the "American Crows with soil-coated bills"/"underground periodical cicada nymphs" connection.

SUMMARY

Between 3 April and 9 May 2021, my wife and I documented a geographic cluster (Figure 11, Table 1) of several American Crows with distinctly pale maculated bills (Figures 12A, 12B, and 12C) in the Sherwood Forest

neighborhood of Silver Spring, Maryland. This phenomenon of American Crows with pale bills had not been previously reported in the literature. As you can see, the activities of these crows were concentrated in a small area of the neighborhood. I birded beyond this area such as Scott Drive, Sherwood Forest Drive, and Locksley Lane but I only observed the expected American Crows with normal black bills or occasionally, Fish Crows. After 9 May 2021, the only crows I observed in this same small area were all American Crows with normal black bills. In early July, five fledged juvenile American Crows with black bills were observed in the same area where the crows with the pale bills had been observed. This unique cluster of American Crows with pale bills appears to have been correlated with the presence of Brood X periodical cicada underground nymphs since no crows exhibiting pale bills were observed after the cicadas began emerging on 10 May and that no crows with pale bills were observed during the 3 April–9 May period in 2022, the subsequent year.

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Nocturnal Bird Migration over Frederick, Maryland, Spring and Fall 2021

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Abstract: Recording of nocturnal flight calls opens a fascinating window into the largely hidden world of nocturnal bird migration. In 2021, I recorded calls from my backyard on most suitable nights in the spring and fall, for a total of 1,415 hours of recording over 157 nights. To the best of my knowledge, this was the most comprehensive study of nocturnal flight calls conducted in Maryland. I detected more than 164,000 flight calls that were identifiable to at least genus or family, attributed to approximately 86,000 individual birds of 133 species—at least 110 of which were thought to be overflying migrants, with the remainder local residents. Swainson's Thrush was easily the most abundant species, accounting for almost 40% of all calls, but there were 100s or 1,000s of detections for 34 other species. Seasonal patterns show a strong peak of spring migration in early May and a more protracted fall peak in mid-September through mid-October. In addition to the common migrants, I detected several unexpected county or state rarities, including Black Rail, Whimbrel, Bicknell's Thrush, Evening Grosbeak, Clay-colored Sparrow, and Connecticut Warbler.

Keywords: nocturnal flight calls, NFC, Frederick MD, migration

Bird migration has long held a deep fascination—as far back as the Classical Era, the likes of Aristotle and Pliny the Elder mused about seasonal changes in bird populations (Hughes 2009). However, how birds migrate was shrouded in mystery for millennia, and a sound scientific understanding has only fully developed in recent decades, while much remains to be learned. That many bird species migrate at night was first noted as early as the 1830s (Bachman 1836) and further documented in the late 19th century when astronomers observed birds flying in front of the moon (Scott 1881). A few years later, Orin Libby counted over 3,800 nocturnal flight calls on one September night in Wisconsin, bringing attention to the possibility of detecting nocturnal migration aurally (Libby 1899). The techniques available for the study of nocturnal birds were boosted by the discovery, in World War II, that birds could be detected by radar (Lack and Varley 1945)—the advent of the scientific discipline of radar ornithology (Eastwood et al. 1962, Fox and Beasley 2010). The post-war years also saw "moon-watching" for nocturnal migrants receive a great deal of attention, and coordinated counts were conducted from the mid-1950s (Lowery 1949, Tunmore 1956). Around the same time, mass mortality events of

nocturnal migrants attracted to powerful light beams at airports (Howell et al. 1954, Howell 1955), provided early documentation of the impediment that rapidly increasing infrastructure placed in the path of bird migration.

It was not until the 1950s that serious attempts were made to capture audio recordings of the flight calls of nocturnal migrants (Graber and Cochran 1959), and progress in those efforts was initially slow, hampered by the cost and size of recording equipment. In the mid-1980s, efforts to record and identify nocturnal flight calls received renewed interest (Evans 2022), with automated recording introduced in 1987 (Dierschke 1989), automated flight-call detection and identification software in the mid-1990s (Mills 1995), and the publication of a ground-breaking CD-ROM of nocturnal flight calls in 2002 (Evans and O'Brien 2002). In the 20 years since then, the digital audio revolution has made the recording of audio more affordable and accessible, and the number of available resources to help with flight call identification has grown steadily, prompting a steady increase in the number of ornithologist and birders who have turned their attention to recording the marvel of the nocturnal flight calls. It was noted that the lockdown in the early months of the COVID-19 pandemic may have spurred an uptick in interest in nocturnal flight recording, at a time when birders were less able to travel (Gregg 2021). The use of machine learning has led to rapid advances in the development of automated detectors and identifiers of nocturnal flight calls (Salamon et al. 2016, Lostanlen et al. 2018), which allows for much more rapid analysis of audio recordings. Partly as a result of these advances, several comprehensive studies of the seasonality of nocturnal flight calls have been published in recent years (Evans and Mellinger 1999, Smith et al. 2014, Evans 2021, Lee et al. 2021).

The scientific and conservation value of understanding nocturnal bird migration has resulted in a rapid upswing in scientific papers over the last 10 years. We now know a great deal about the phenomenal numbers of migrants that pass through the United States each year (Dokter et al. 2018), the altitudes that nocturnal migration occurs (Bruderer et al. 2018, Sjöberg et al. 2021), and how migration is affected by environmental conditions such as weather (Kemp et al. 2013, Shamoun-Baranes et al. 2017) and light pollution (Van Doren et al. 2017, Cabrera-Cruz et al. 2019). This in turn helps us understand the potential hazards that human structures place in the path of migrating birds, which shows that we can mitigate against the factors that results in the mortality of hundreds of millions of birds annually in the United States (Loss et al. 2014, Davy et al. 2017, Elmore et al. 2021, Horton et al. 2021).

I began my first tentative steps into recording nocturnal flight calls in May 2018, but was so overwhelmed with the process of learning and identifying calls that I only recorded for three nights. As my confidence and speed of analysis increased, I recorded more frequently in 2019 and 2020, and in 2021, due to

personal circumstances that gave me more spare time, I decided to attempt a full annual migration cycle of recording. My aims were to document the species composition, and seasonal and diel cycle of migration patterns of nocturnal migration over my house in Frederick, Maryland. Of course, I also hoped that I might detect the nocturnal calls of local rarities among the thousands of commoner migrants.

METHODS

I attempted to record nightly through the spring (late February to early June) and fall (mid-July to mid-November) migration seasons. Audio recordings were taken from the deck of my backyard on the northern edge of Frederick, Maryland (39.47323° north, 77.43447° west, elevation 124 m [407 ft]). The location is relatively quiet, but with some anthropogenic noise pollution due to local vehicle traffic, heating/AC units, and other noises typical of residential development. Non-avian biological noise was significant, with amphibians through the spring, and various orthopterans and other insects through the summer and fall (Figure 1). I recorded using an Old Bird 21c microphone v2010 (Old Bird 21c 2022) attached to a Roland-R26 handheld recorder. The equipment was in a small but open backyard, unencumbered by tree canopy, but the proximity to my two-story house may have reduced detections to the south. I recorded on the nights of 25/26 February through 10/11 June, and again from 10/11 July to 14/15 November. Bird migration occurs almost year-round in Maryland, with weather induced-migration events during winter, and a near overlap between northbound and southbound migrants during midsummer, but I chose not to record outside of the main migration periods due to time constraints. Recordings were taken between civil twilights of dusk (30 minutes after sunset) and dawn (30 minutes before sunrise), in accordance with eBird Nocturnal Flight Call protocol practices (eBird 2021), on most nights when the weather was suitable. High winds or persistent heavy rain were considered unsuitable for recording either because they would result in little detectable activity or pose a risk to recording equipment. Recording was not possible on a few nights or partial nights due to my absence from home, and a few nights of recording were lost to (usually human-induced) apparatus failure. Nonetheless, I recorded over a total of 549 hours on 68 nights in spring, and 866 hours on 89 nights in fall. I rarely "listened live" during the times that I recorded, and relied entirely on the audio recordings for my report.

Audio files were transferred from SD cards to a cloud server, and spectrograms of recordings (example screen shot in Figure 1) inspected visually in Program Audacity (Hamming window, window size=1024, zero padding factor=4 [Audacity Team 2021]) to find and identify bird call notes. Calls were identified based on widely available resources including the *Flight Calls of Migratory Birds* (Evans and O'Brien 2002), the *Peterson Field Guide to Bird Sounds of*

Eastern North America (Pieplow 2017), and the wealth of recordings uploaded to the Macaulay Library (Cornell Lab of Ornithology 2022) and xeno-canto (2022). For discussion of challenging identifications, the active and ever helpful Nocturnal Flight Calls Facebook group (Facebook 2022) was an invaluable source of information and encouragement. Despite the wealth of resources now available to help identify nocturnal flight calls, the calls of some species remain challenging or impossible to identify. Warblers present significant challenges, and 56% of my warbler detections in 2021 went unidentified to species. I find separating the calls of Fox (*Passerella iliaca*) and Song (*Melospiza melodia*) Sparrows challenging, and many such calls were logged as "sparrow sp." I also have a blind-spot for the "vewy" calls of Veery (*Catharus fuscescens*) and Scarlet Tanager (*Piranga olivacea*), tending to consider most of them to be the former, but I no doubt made identification mistakes. Although I tried to exercise caution with call identification, given the challenges, I must acknowledge that I have made many mistakes, and hence the patterns identified in this report should be interpreted with that understanding.

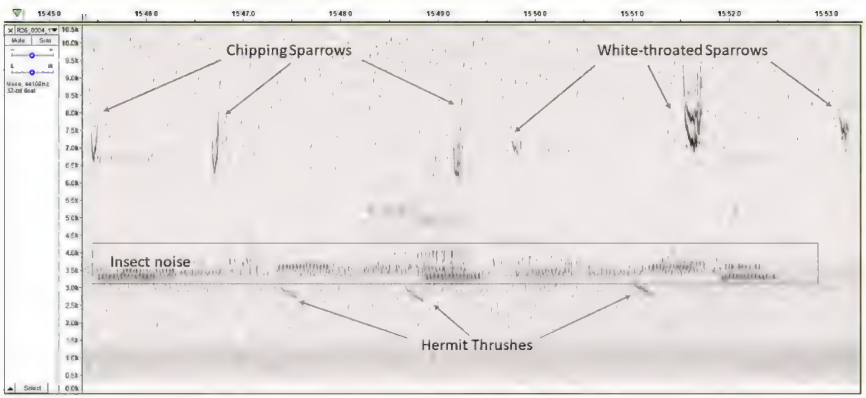

Figure 1. Example of spectrogram of a nocturnal flight recording (spectrogram parameters Hamming window, window size=1024, zero padding factor=4). An 8-second clip from 28 October 2021, Frederick, Maryland. X-axis is time in second, Y-axis is sound frequency in kilohertz.

For each call, I tried, as best I could, to identify multiple call notes of individual birds, based on spacing of the individual calls, changes in call volume as the bird moves overhead, and the call spectrogram. It should be noted that these estimates are likely very imprecise, but eBird NFC protocols require estimating the number of birds as best practice. At times of light migration, assessing the number of individuals birds was often straightforward, but on nights of heavy flights, it was impossible. Under those circumstances I applied a correction factor to estimate the number of birds based on calls. These were conservative,

for example, for Swainson's Thrush (*Catharus ustulatus*), I estimated based on a factor of 2.2 calls/individual (i.e., each bird detected called 2.2 time on average), and for sparrows I used a ratio of 2 calls per bird. Both these ratios of calls to birds are higher than measured at quieter times, and hence, I considered by estimates to err on the conservative side. Because estimating bird numbers from calls is likely very imprecise, most of the data analysis included in this summary are based on the number of nocturnal flights call (NFCs), and estimates of the number of individual birds should be viewed with great caution. Even with NFCs there is ambiguity, for example some species, such as cuckoos and shorebirds, typically call in volleys of multiple notes/second. In such cases a volley of calls was considered one NFC, but if the volley was repeated after a few seconds, that would be a second NFC. From my passerine observations, thrushes, sparrows, and some species of warblers are typically detected two or more times as they pass overhead, but other species, those with a longer interval between calls, are more often detected only once.

My data were divided into hour long checklists, in accordance with eBird NFC protocols. My one-hour checklists started on the hour, so partial hours were often included at the start and end of each night, depending on the times of civil twilight. I logged each individual call on paper tallies and transferred species totals to spreadsheets, which could then be imported into an eBird NFC station user account (username: Andy Wilson NFC Station). The eBird checklists included my very approximate assessment of the number of birds counted, and the total number of NFCs in comment details. Additionally, I uploaded a sample of audio clips to checklists, usually to support identification of unusual records, or in cases where the recording was a good clean example of a call. A total of 3,376 audio recordings of NFCs were included in my eBird checklists in 2021. Dates stated in the Results section sometimes refer to an individual date for specific birds (e.g., 4 May), or they can refer to monitoring nights (e.g., 4/5 May) if discussing totals over a single night, which spans two dates (i.e., pre-midnight and post-midnight).

I produced data visualizations showing seasonal patterns by week of the year and time of each night in Program R (R Foundation for Statistical Computing, Vienna, Austria). To produce graphs of nightly patterns, I calculated the percentage of the time between sunset and sunrise of the midpoint of each hourly checklist, and fitted a curve to the estimate the rate of NFCs/hour as a function of % of the way through the night, using a Generalized Additive Model in package MGCV (Mixed GAM Computation Vehicle) (Wood 2022). I produced separate models for each season by including season as a factor. Having the exact time of each call would be a preferential way to examine nightly patterns, but my 1-hour checklist data were not collated to allow for that, and hence, the fitted curves that are based on hourly midpoints could lack some precision.

RESULTS

In all, I detected more than 164,000 flight calls that were identifiable to at least genus or family, attributed to approximately 86,000 individual birds. Fall migration was much heavier than spring with a mean of 211 calls per hour, compared to 94 calls per hour in the spring. These patterns were consistent across the dominant species groups of thrushes, sparrows, and warblers (Figure 2). Spring migration peaked sharply in early May with 5,817 NFCs on 3/4 May and 5,235 NFCs on 4/5 May. Fall migration peaked in the second half of September with 14,474 NFCs on 16 and 13,376 on 28 September. Heavy migration in fall was often dominated by Swainson's Thrushes, which was easily the most detected species across the year (Appendix).

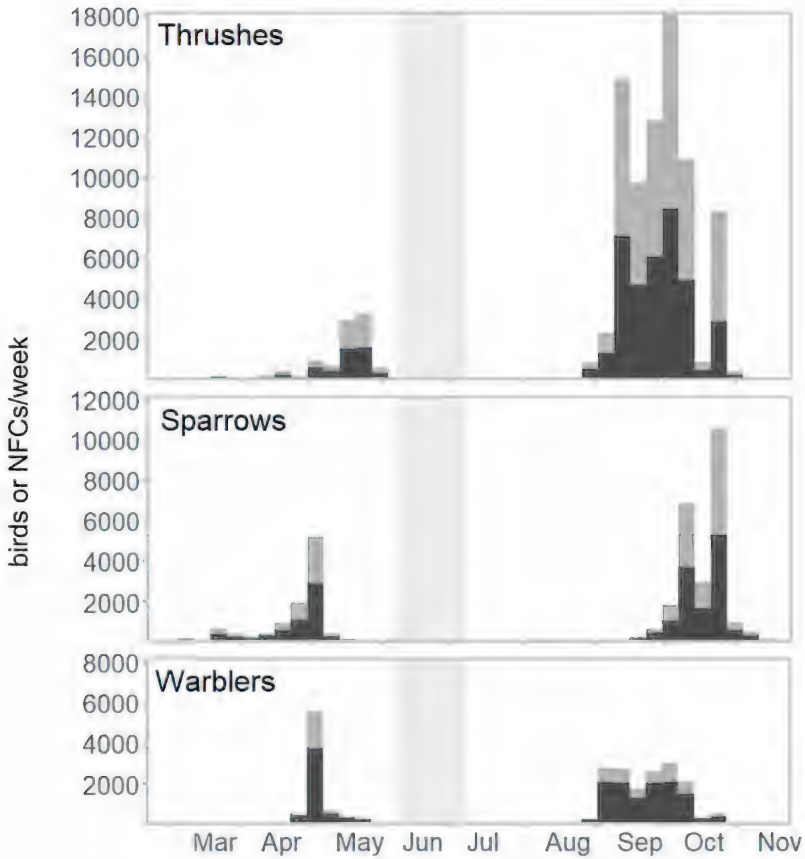

Figure 2. Seasonality of thrush, sparrow, and warbler migration, by week, over Frederick MD in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

In all, I recorded the calls of 133 bird species from my backyard station in 2021, slightly more than half of the 238 species reported to eBird in Frederick County in 2021. Of those, as many as 20 were likely local residents, usually recorded around dusk or dawn, but even so, the number of genuine nocturnal flight migrants exceeded 100 species. Much of the rest of this report focuses on occurrence patterns among the commoner migrants, discussed by taxonomic group, but the number of local and even statewide rarities that I recorded in 2021 was remarkable (Figure 3).

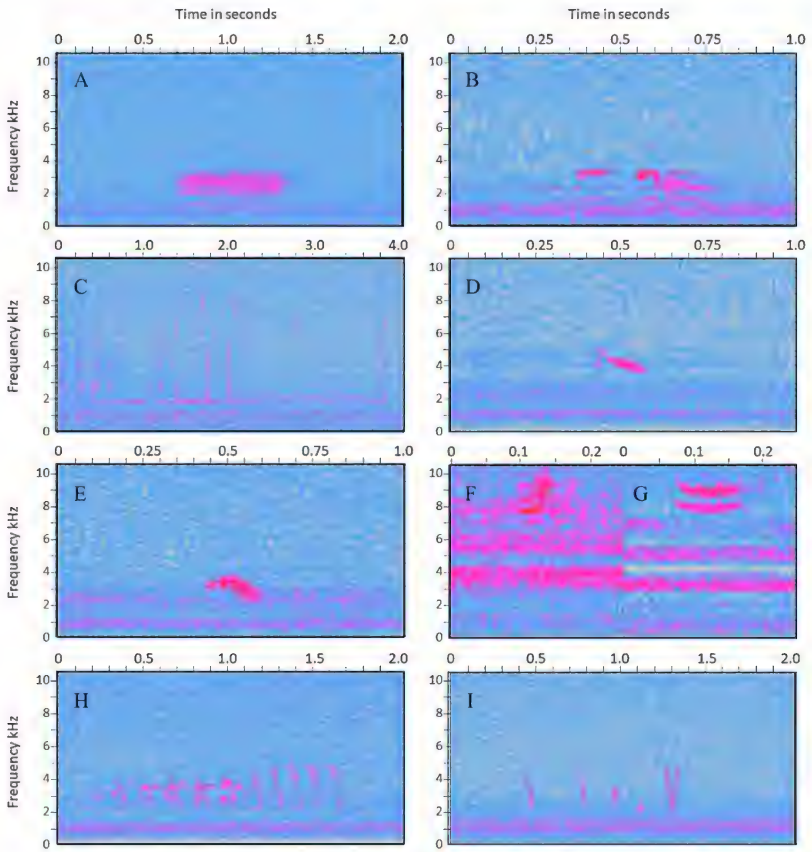

Figure 3. Spectrogram views (in Program Audacity) of nocturnal flight calls of a selection of county rarities from Frederick, Maryland in 2021. A. King/Clapper Rail (Macaulay Library asset 344684551) on 25 May. **B.** Black Rail on 17 May (ML 342235681). **C.** Whimbrel song on 24 May (ML 344683051). **D.** Bicknell's Thrush on 24 May (ML 344683151). **E.** Evening Grosbeak on 3 May (ML 339009231). **F.** Clay-colored Sparrow on 18 Sept (ML 381969291). **G.** Nelson's Sparrow on 20 Sept (ML 384068931). **H.** Lincoln's Sparrow song on 15 May (ML 341623501). **I.** Connecticut Warbler song on 31 May (ML 346237491). Note that clips are of varying lengths.

Waterfowl

Tundra Swans (*Cygnus columbianus*) were a feature of the first couple of weeks of spring migration, with wedges recorded 17 times, on seven different nights between 26 Feb and 10 March. Canada Geese (*Branta canadensis*) and Mallard (*Anas platyrhynchos*) were recorded regularly throughout the year, with most likely being local birds. Five additional species of duck were identified based on calls, with most records during March, including 4 Wood Ducks (*Aix sponsa*), 3 Gadwall (*Mareca strepera*), 4 American Wigeon (*M. americana*), and 2 Green-winged Teal (*Anas crecca*). A highlight of the early spring was the migration of Long-tailed Ducks (*Clangula hyemalis*) on five different nights between 19 and 26 March, with a total of 15 groups recorded. The birds were all recorded between 2123 and 0032 hours, or 2:10 to 5:20 hours after sunset at the Chesapeake Bay, which is a likely source of these birds. Other than Mallard, a Wood Duck on 28 October was the only duck recorded in the fall.

Cuckoos

Both cuckoos were surprisingly common migrants in both spring and fall, with 1,110 Yellow-billed (*Coccyzus americanus*) and 639 Black-billed Cuckoo (*C. erythropthalmus*) NFCs recorded during the year (Appendix). Numbers were lower in the fall, but both species were recorded regularly through the late summer, peaking in mid-August (Table 1, Figure 4). The peak nights for the two species were the same in spring (18/19 May) and fall (13/14 August). Estimating the number of birds involved is difficult for cuckoos because some of the birds could be moving locally at a low level, hence the number of estimated birds should be treated with caution. It would be interesting to see whether these birds persist in the area between the spring and fall migration seasons, the Yellow-billed Cuckoo is a common breeding bird in Frederick County, but the Black-billed is scarce (Ellison 2010), with no confirmations of breeding in the first two years of the 3rd Maryland-DC Breeding Bird Atlas.

Table 1. Nights of peak cuckoo migration over Frederick, Maryland in spring and fall 2021.

			Peak Night		
Species	Season	Nights Recorded	Date	NFCs	Estimated Birds
Yellow-billed	spring	32	18–19 May	147	84
	fall	30	13–14 Aug	32	12
Black-billed	spring	29	18–19 May	96	30
	fall	28	13–14 Aug	15	6

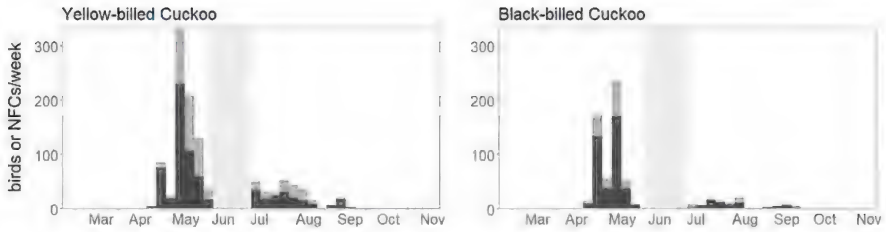

Figure 4. Seasonality of cuckoo migration, by week, over Frederick, Maryland in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

Rails

Sora (*Porzana carolina*) and Virginia Rails (*Rallus limicola*) were regular spring migrants with a total of 11 Virginia Rails detected between 4 April and 2 June, and 9 Sora between 28 April and 21 May. Lower numbers were reported on return migration with a single Virginia Rail on 20 September, and a total of 6 Sora between 7 and 25 September. More surprising was a King (*R. elegans*) or Clapper Rail (*R. crepitans*) recorded on 11 March, and another on consecutive nights at 0231 and 2348 hours on 25 May (Figure 3). The two 25 May records, surely of one bird, suggest that the bird was moving locally. The last eBird record of King Rail in Frederick County was 10 years ago, and Clapper Rail has never been recorded (Iliff et al. 1996). An even greater surprise, and the highlight of the year was a Black Rail (*Laterallus jamaicensis*) recorded at 2345 hours on 17 May (Figure 3), and then again at 0215 hours on 6 June. Were these the same bird? Does this indicate a sustained presence somewhere in the county during the spring? A most intriguing occurrence. Rounding out the Rallidae, was Common Gallinule (*Gallinula galeata*) on 4 May.

Shorebirds

Killdeer (*Charadrius vociferus*) were recorded frequently throughout the spring and fall, and while some could have been migrants, it is likely that most were local birds. Spring shorebird migration got underway with 3 American Woodcock (*Scolopax minor*) between 10 and 26 March and 5 Wilson's Snipe (*Gallinago delicata*) between 25 March and 19 April. For both of these species, displays were recorded, so whether these birds were in active migration when recorded, is open to question. Spring shorebird migration was dominated by Spotted (*Actitis macularius*) and Solitary (*Tringa solitaria*) Sandpipers. Estimating the numbers of shorebirds from recordings is challenging at best, because many recordings are of flocks of indeterminate size. My best guess, based on minimum numbers audible in the small flocks, is that at least 109 Spotted and 115 Solitary Sandpipers were recorded, which is more than the number of records (Table 2), with strong peaks of both species during May

(Figure 5). Semipalmated Plovers (*Charadrius semipalmatus*) and Least Sandpipers (*Calidris minutilla*), were frequent during May (Table 2) and a steady migration of Short-billed Dowitchers (*Limnodromus griseus*) was notable for Frederick County, where there were no other spring records in 2021; a total of 10 flocks were noted between 15 and 21 May. Also rare in Frederick County were Black-bellied Plover (*Pluvialis squatarola*) with 2 records of 3 birds; Whimbrel (*Numenius phaeopus*), with 3 records including a bird in song (Figure 3), and Dunlin (*Calidris alpina*), with 4 records, including one sizable flock. In all, 14 species of shorebird were recorded during spring migration (Table 2).

Fall shorebird migration was lighter, both in terms of numbers and diversity (Table 2), but highlights included an American Golden-Plover (*Pluvialis dominica*) on 4 October, and no less than 4 Upland Sandpiper (*Bartramia longicauda*) between 31 August and 26 September. It was worth noting that neither of these species were reported diurnally in Frederick County in 2021. Return migration of American Woodcock was observed between 24 October and 2 November with a total of 6 records.

Table 2. Summary of spring and fall observation of nocturnal shorebirds records, Frederick, Maryland 2021. "Records" is the total number of separate occurrences, not the number of birds, which was much higher for many species, but often impossible to enumerate. *Killdeer records were frequent but it is assumed that most were of local birds.

	Spring			Fall		
Species	**First**	**Last**	**Records**	**First**	**Last**	**Records**
Black-bellied Plover	7 May	25 May	2	-	-	-
American Golden-Plover	-	-	-	4 Oct	4 Oct	1
Killdeer	25 Feb	26 May	*	11 Jul	11 Nov	*
Semipalmated Plover	18 May	30 May	14	-	-	-
Upland Sandpiper	-	-	-	31 Aug	26 Sep	4
Whimbrel	24 May	25 May	3	-	-	-
Dunlin	21 May	26 May	4	-	-	-
Least Sandpiper	3 May	26 May	11	19 Jul	13 Sep	2
Pectoral Sandpiper	21 May	21 May	1	-	-	-
Semipalmated Sandpiper	24 May	24 May	2	-	-	-
Short-billed Dowitcher	15-May	21 May	10	-	-	-
American Woodcock	10 Mar	26 Mar	3	24 Oct	2 Nov	6
Wilson's Snipe	25 Mar	19 Apr	5	-	-	-
Spotted Sandpiper	27 Apr	4 Jun	73	10 Jul	30 Jul	9
Solitary Sandpiper	28 Apr	19 May	38	9 Jul	6 Oct	7
Spotted/Solitary Sandpiper	28 Apr	26 May	8	12 Aug	12 Aug	1
Greater Yellowlegs	3 May	3 May	1	-	-	-
yellowlegs sp.	27 Apr	6 May	2	13 Oct	13 Oct	1

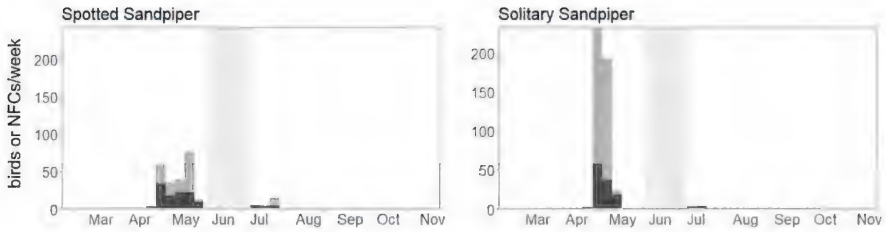

Figure 5. Seasonality of Spotted and Solitary Sandpiper migration, by week, over Frederick, Maryland in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

Other non-passerines

Ring-billed Gulls (*Larus delawarensis*) were regular nocturnal migrants in small numbers in early spring with calls recorded on nine nights between 8 March and 13 April.

Great Blue Heron (*Ardea herodias*), Black-crowned Night-Heron (*Nycticorax nycticorax*) and Green Heron (*Butorides virescens*) were recorded regularly, especially in the spring, but it is likely that most of these were local birds. The frequency of American Bittern (*Botaurus lentiginosus*) detections was quite surprising given their relative scarcity in Frederick County; 13 were recorded in spring between 28 March and 9 May, and 28 in fall between 10 September and 23 October. Least Bitterns (*Ixobrychus exilis*) were recorded on three spring nights between 17 May and 2 June, and three nights between 16 August and 28 September.

The regular occurrence of Barn Owls (*Tyto alba*) over my yard has been a constant surprise over the last few years, given that I have never seen or heard one in the neighborhood. In 2021, I recorded them 45 times, and in every month from February through October. I assume that these are local birds, but with a strong uptick in records in March to mid-April, it is possible that some were migrants. Local Great Horned (*Bubo virginianus*) and Barred (*Strix varia*) owls were recorded with some regularity, and Eastern Screech-Owl (*Megascops asio*) occasionally.

Red-headed Woodpecker (*Melanerpes erythrocephalus*) was a surprising pick-up, but I recorded birds—presumably overflying migrants—during nighttime hours on 17 and 19 September, and 10 October. This is a species that is known to be migratory in northern parts of its range (Frei et al. 2020).

Thrushes

All four regularly occurring *Catharus* thrushes and Wood Thrush (*Hylocichla mustelina*) were detected in much larger numbers in fall than in spring, with Hermit Thrush (*C. guttatus*) and Gray-cheeked Thrush (*C. minimus*) totals

around 15 times higher in fall than spring. Hermit Thrushes migrated earlier in the spring and later in the fall than other thrushes, with Veery and Wood Thrush sharing similar seasonal patterns, and Swainson's and Gray-cheeked showing later migration in both spring and fall (Figure 6). Swainson's Thrush was easily the most detected species of the year with 67,326 NFCs accounting for almost 40% of all passerine NFCs. Bicknell's Thrushes (*C. bicknelli*), have a flight call that is like that of Gray-cheeked Thrush, but tends to be of higher maximum frequency (Evans 1994, Whitaker et al. 2020). Due to overlap in call notes between Bicknell's and some subspecies of Gray-cheeked Thrush, there is currently not a well-established benchmark for how high a maximum frequency a call should be to assign it to Bicknell's Thrush but it is thought to be over 5 kHz (W. Evans, in litt., 25 May 2021). In total, I had three thrush calls that were high enough to fall comfortably above the frequency range expected for Gray-cheeked Thrush (e.g., in Figure 3), and several other strong Bicknell's candidates that were documented as Gray-cheeked/Bicknell's. American Robin (*Turdus migratorius*) migration patterns are clouded by frequent detections of local birds—those thought to be migrants showed a strong peak in April, but few were detected in fall (Figure 6).

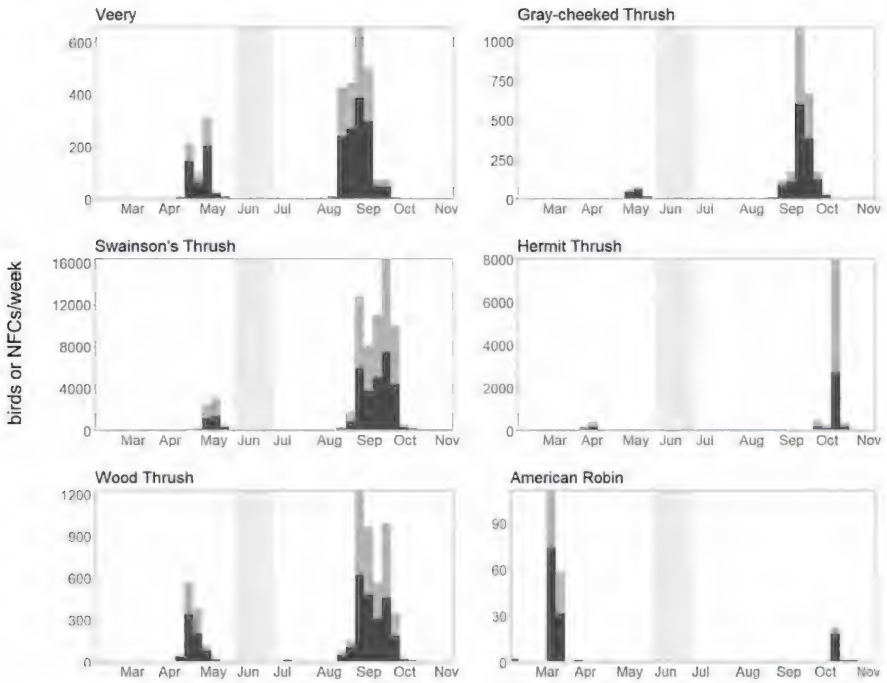

Figure 6. Seasonality of thrush migration, by week, over Frederick, Maryland in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

Sparrows

Sparrow migration is protracted with Grasshopper Sparrow (*Ammodramus savannarum*) almost ubiquitous from mid-spring onwards (Figure 7). To what extent the June, July, and August detections of Grasshopper Sparrows are migrants is an open-question; I theorize that some of these are wandering local breeders, pushed around by mowing of their grassland habitats. White-throated Sparrow (*Zonotrichia albicollis*) was the most abundant sparrow species overall in both spring and fall (Appendix), followed by Savannah Sparrow (*Passerculus sandwichensis*) and then Chipping Sparrow (*Spizella passerina*). The abundance of Song Sparrows is clouded due to the difficulty of separating their calls from Fox Sparrows, but any calls after the first week in April, and before the last week of October are likely to be Song Sparrows because Fox Sparrows are locally rare between those times. The spring pattern of Song/Fox migration shows two distinct peaks in spring with little overlap (Figure 7), and it is tempting to speculate that the two peaks represent the two species. I underreported Dark-eyed Junco (*Junco hyemalis*) in the spring, due to confusion of possible migrants with local birds calling at night, but even in fall, numbers were modest compared to other sparrows.

Lincoln's Sparrow (*Melospiza lincolnii*) and Swamp Sparrow (*M. georgiana*) flight calls are not, to my knowledge, reliably separable, but I was able to confirm one migrant Lincoln's Sparrow when a bird sang, presumably in flight, on 15 May (Figure 3). In addition to the more common sparrows, I recorded a Clay-colored Sparrow (*Spizella pallida*) on 18 September and a Nelson's Sparrow (*Ammospiza nelsoni*) two days later (Figure 3), while a possible Ipswich Savannah Sparrow (*Passerculus sandwichensis princeps*) on 25 September was intriguing this far inland (Figure 8).

Warblers

The ten most common readily-identifiable (by NFC) warblers shared similar seasonal patterns, with most of them showing a much more protracted fall migration than spring (Figure 9). Spring peaks were pronounced for most species, with most birds during the first week of May. Canada Warbler (*Cardellina canadensis*) was a notable exception, with a peak in mid-May. For most of these species, overall numbers in spring and fall were similar, but Bay-breasted (*Setophaga castanea*) and Palm (*S. palmarum*) Warblers showed much stronger fall migrations, with fall totals eight and eleven times higher than spring totals, respectively. More than half of warblers went unidentified. These would include those giving "zeep" calls—including the presumably abundant Blackpoll (*S. striata*) and Yellow (*S. petechia*) Warblers among others—and "short rising seep" group, including Black-throated Green (*S. virens*), Tennessee (*Leiothlypis peregrina*), Nashville (*L. ruficapilla*), and at least some Yellow-rumped (*S. coronata*) Warblers, which have variable calls, some of which are difficult to identify (Evans and O'Brien 2002).

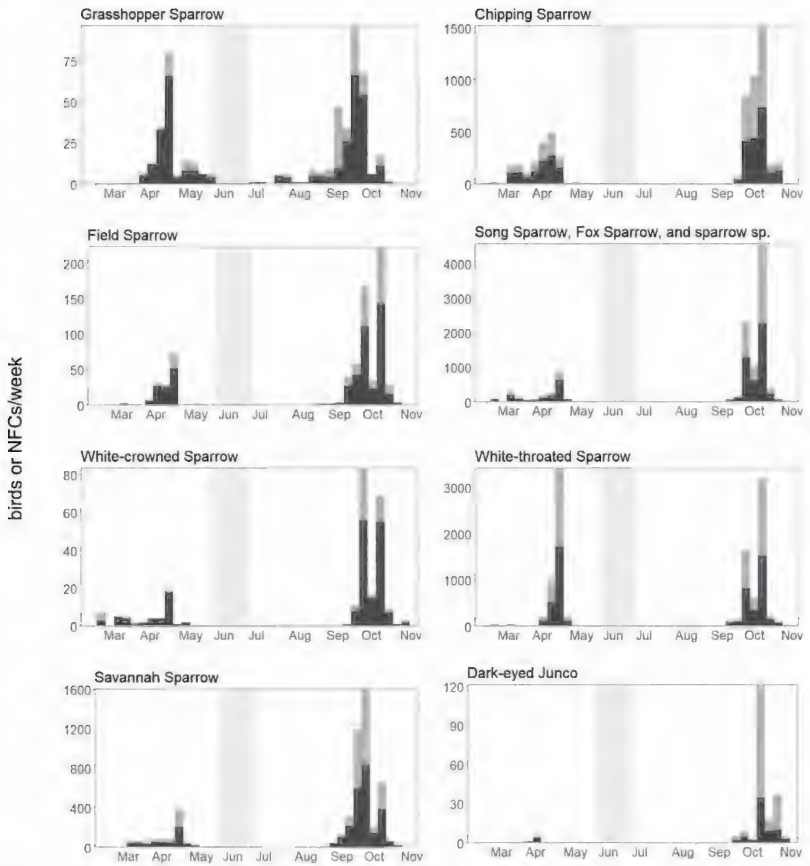

Figure 7. Seasonality of sparrow migration, by week, over Frederick, Maryland in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

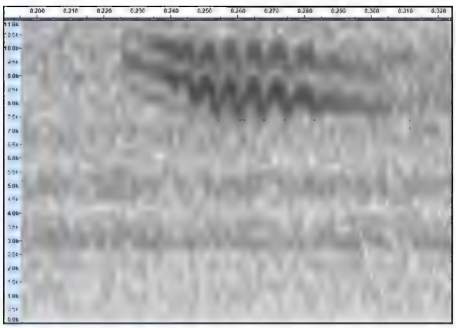

Figure 8. Spectrogram of a putative Ipswich Savannah Sparrow flight call recorded over Frederick MD on 25th September.

Of particular interest among the scarcer warblers was a singing Mourning Warbler (*Geothlypis philadelphia*) on 18 May, and even more astonishingly—given its rarity in Maryland on spring migration (Beehler 2019) —a singing Connecticut Warbler (*Oporornis agilis*) on 31 May (Figure 3).

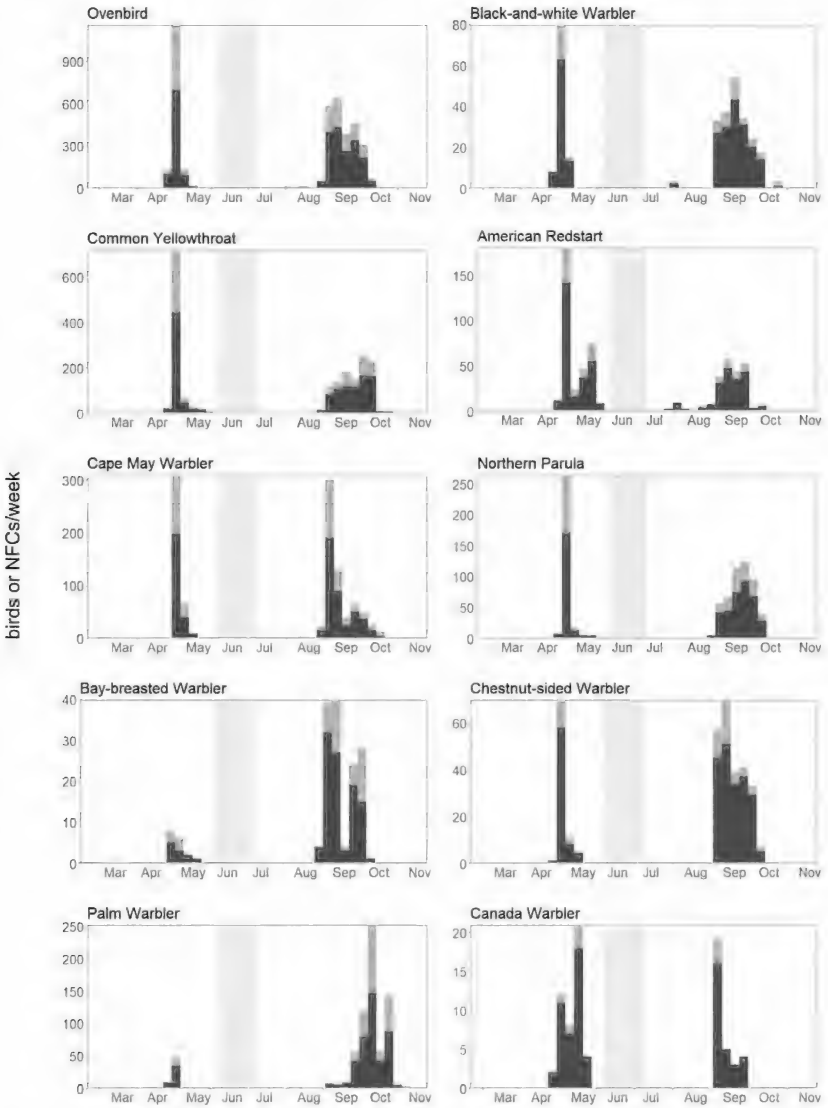

Figure 9. Seasonality of warbler migration, by week, over Frederick, Maryland in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

Other passerines

The Rose-breasted Grosbeak (*Pheucticus ludovicianus*) was one of the most abundant nocturnal migrants in both spring and fall (Figure 10; Appendix), and was often associated with strong flights of thrushes. Bobolink (*Dolichonyx oryzivorus*) and Indigo Bunting (*Passerina cyanea*) were also common, but spring totals were more than twice as high as those in fall (Figure 10). Dickcissel (*Spiza americana*) was a surprisingly regular migrant with 4 in spring, 1 in mid-summer, and 12 in fall (Figure 10), although it should be noted that this species has held territory nearby, including within earshot in some recent years.

Despite the vast numbers of passerines recorded from my station in 2021, the list of the most numerous species (Appendix) has many notable omissions because many common migrants rarely call or have calls that are obscure and not well-documented. Even so, I was able to document several species due to apparent nocturnal flight song, including Acadian (*Empidonax virescens*) and Willow (*E. traillii*) Flycatchers, Baltimore (*Icterus galbula*) and Orchard (*I. spurius*) Orioles, and several warbler species that are not easy to discern by their calls.

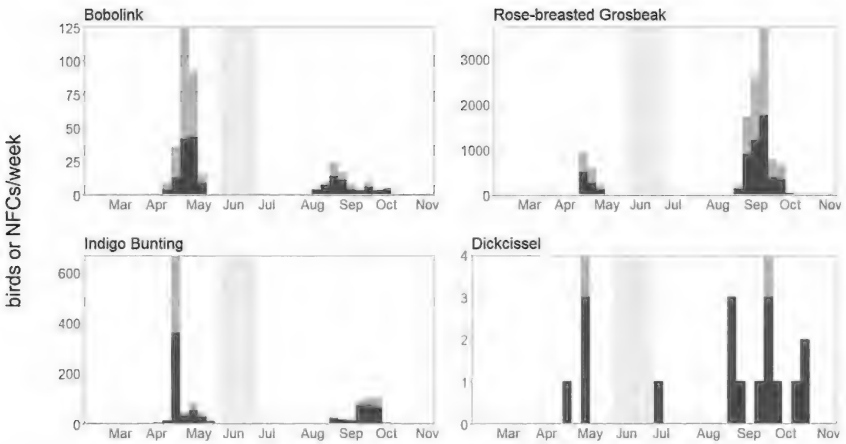

Figure 10. Seasonality of Bobolink and Cardinalidae migration, by week, over Frederick, Maryland in 2021. Estimated individual birds in dark gray, NFCs in mid gray. Light gray represents the summer period when there was no recording (June and early July).

Nightly migration patterns

Analysis of the timing of migrants through the night shows that migration rates for most species peak between 0000 and 0100 hours – or approximately 50% of the time between sunset and sunrise (Figure 11). Unlike other species groups, bitterns and herons, and shorebirds (especially Spotted and Solitary Sandpipers)

are often recorded shortly after dusk (Figure 11). There are some differences between species groups, for example cuckoos peak slightly later in the night than most passerines, and *Catharus* thrushes still overfly in good numbers close to dawn. However, I do not pick up a marked pre-dawn descent of thrushes reported by other observers (Kearney 2010), which I attribute to a lack of large forest patches to the immediate north and south of my station. Of interest was the paucity of warbler recordings from the periods immediately around dusk and dawn, which tallies with my personal observations in the area—where early morning warbler flights are negligible in comparison to those observed at well-known coastal watch points.

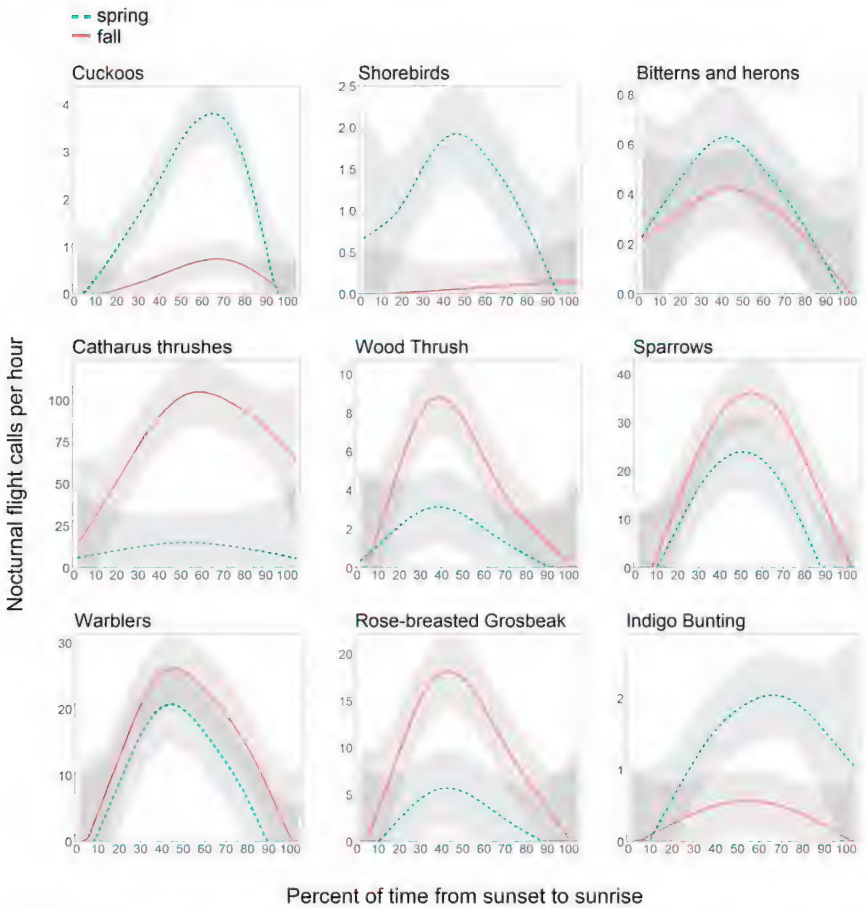

Figure 11. Nightly pattern of NFC detections in Frederick, Maryland for key species groups in spring and fall 2021. Smoothed curves were fitted using Generalized Additive Models in Program R. Gray shading indicates the 95% credible interval.

DISCUSSION

My comprehensive study of nocturnal flight calls over Frederick, Maryland provides new insights into the seasonal patterns of migratory birds over central Maryland. To the best of my knowledge, this is the most comprehensive study of nocturnal flight call patterns in the state of Maryland.

The regular detection of scarce species was very gratifying, but this was eclipsed by the sheer numbers of birds detected during peak migration times. The launch of a Migration Dashboard on the BirdCast website in 2022 (Farnsworth 2022) revealed the extent to which the tens of thousands of birds that I recorded are a mere trickle compared to the migratory river of birds that pass overhead each year. The Migratory Dashboard suggests that around 45 million migrant birds pass over Frederick County in a typical spring (Cornell Lab 2022), many of them at altitudes of several thousand feet—too high for my recording equipment to detect.

It is well known that weather plays a key role in determining the volume of bird migration (Gagnon et al. 2011, Farnsworth et al. 2016) and the altitudes at which migration occurs (Dokter et al. 2013, Kemp et al. 2013). Analyzing associations between my bird detections and local and regional weather patterns is beyond the scope of this study, but it was clear that nights with high volumes of calls were often associated with cold weather fronts, and that fine clear weather resulted in few detections, presumably because migration occurred outside of the detection range of my recording apparatus. The dearth of warbler detections after the first week of May (Figure 9) was almost certainly due to a pervasive calm weather pattern through the second and third week of May (Dokter 2021).

Recent outstanding innovations such as BirdCast (Van Doren and Horton 2018) have provided hitherto unprecedented insights into the spatial and temporal patterns of bird migration at the continental scale, but presently, these radar-derived predictive tools do not provide fine-grained data for individual locations or individual species. Hence, there is still much to learn about nocturnal bird migrations by utilizing audio recording, and I aim to continue to record nocturnal flights during future years and hope to obtain long-term data that will shed light on variability between years, as well as between seasons, through seasons, and within individual nights.

ACKNOWLEDGMENTS

I am indebted to many other nocturnal flight call enthusiasts for providing helpful advice, especially with species identifications, over the last several years. I fear offending by omission, but Gavin Aquila, Tim Carney, Bill Evans,

Joe Gyekis, John Kearney, Brian Tinker and Alex Wiebe have all provided useful identifications, corrections, and pointers on multiple occasions. I am also grateful to my wife and children for putting up with my strange and esoteric hobby, and occasionally helping me spot bird calls on spectrograms. My Old Bird 21c microphone was purchased with funds from the Gettysburg College Provost's Office. I would like to thank two anonymous reviewers and the editors of *Maryland Birdlife* for their many useful suggestions, which greatly improved the manuscript.

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Appendix. Summary of nocturnal flight calls observations from Frederick, Maryland during spring and fall 2021 for the 47 most common species. "Hours" represents the number of separate 1-hour eBird checklists that each species was detected in, out of 549 in spring, and 866 in fall.

	Spring				Fall			
Species	**Date**	**Hours**	**Birds**	**NFCs**	**Date**	**Hours**	**Birds**	**NFCs**
Yellow-billed Cuckoo	4/27–6/06	154	512	821	7/10–10/03	133	184	289
Black-billed Cuckoo	4/27–6/06	136	396	541	7/11–10/01	61	70	98
Spotted Sandpiper	4/27–6/04	73	109	225	7/10–7/30	9	11	23
Solitary Sandpiper	4/28–5/19	38	115	452	7/09–10/06	7	7	9
Ring-billed Gull	3/08–4/13	13	20	57				
American Bittern	3/28–5/09	12	13	29	9/10–10/23	24	28	48
Green Heron	4/14–6/03	45	51	118	7/29–10/17	48	63	168
Black-crowned Night-Heron	3/28–6/02	21	23	49	7/10–7/10	1	1	0
Veery	4/27–6/04	101	436	663	8/15–10/12	186	1,292	2,189
Gray-cheeked Thrush	5/16–6/03	44	112	151	9/07–10/24	203	1,331	2,260
Swainson's Thrush	4/28–6/06	175	3,064	6,300	8/24–10/30	405	28,152	61,026
Hermit Thrush	3/28–5/03	38	276	583	9/29–11/12	163	3,203	9,150
Wood Thrush	4/27–6/06	106	668	1,127	7/09–10/28	289	2,247	4,378
American Robin	2/26–6/06	138	108	171	7/09–11/11	55	20	24
American Pipit	4/28–5/03	2	2	2	10/14–11/11	12	25	55
Purple Finch	4/17–4/28	4	10	34	11/02–11/11	5	23	177
Grasshopper Sparrow	4/13–6/05	76	146	179	7/12–10/31	121	201	310
Chipping Sparrow	3/09–6/03	162	1,082	1,856	7/14–11/13	251	1,893	3,913
Field Sparrow	3/26–5/30	52	115	148	7/12–11/10	137	374	567
Fox Sparrow	3/09–3/28	11	19	35	10/19–11/13	22	29	42
Dark-eyed Junco	3/30–4/19	10	5	7	10/08–11/14	40	66	199
White-crowned Sparrow	2/28–5/15	30	44	51	10/01–11/13	81	145	195
White-throated Sparrow	2/26–5/26	140	2,564	4,976	9/25–11/15	285	3,107	6,081
Vesper Sparrow	4/11–5/19	8	10	10	9/25–10/25	20	28	37
Savannah Sparrow	3/11–6/01	144	534	864	9/03–11/13	342	2,402	4,258
Song Sparrow	3/09–5/13	75	316	506	9/21–11/14	211	2,949	6,348
Lincoln's/Swamp Sparrow	4/28–5/05	6	10	13	9/26–10/31	72	139	181
Bobolink	4/28–5/26	39	111	278	8/27–10/17	44	56	85
Baltimore Oriole	4/28–5/19	14	20	30	9/03–9/03	1	1	1
Ovenbird	4/19–5/28	70	903	1,456	7/1–10/17	277	1,768	2,511
Northern Waterthrush	4/28–5/22	20	43	46	7/24–9/17	9	9	9
Black-and-white Warbler	4/28–5/10	25	84	103	8/03–10/23	98	168	205
Common Yellowthroat	4/28–6/03	64	547	862	7/28–10/28	206	782	1,079
American Redstart	4/28–6/03	72	267	347	7/22–10/16	114	189	227
Cape May Warbler	5/03–5/21	30	245	385	8/14–10/17	144	424	642
Northern Parula	4/28–6/05	38	199	299	9/03–10/14	143	350	495
Magnolia Warbler	5/03–6/03	5	9	11	9/04–10/07	43	60	77
Bay-breasted Warbler	5/05–5/23	8	11	17	9/03–10/11	64	101	140
Chestnut-sided Warbler	4/28–5/19	15	71	86	9/04–10/12	100	201	247
Black-throated Blue Warbler	4/28–5/31	37	322	573	8/30–10/23	160	489	709
Palm Warbler	4/20–5/05	17	43	57	9/07–11/10	145	425	656
Yellow-rumped Warbler	4/11–5/10	40	264	403	9/20–11/08	140	443	638
Prairie Warbler	5/02–5/05	8	17	16	8/31–9/10	6	6	7
Canada Warbler	4/27–5/26	30	42	47	9/07–9/29	19	28	31
Scarlet Tanager	5/12–5/25	28	36	43	10/01–10/01	1	1	1
Rose-breasted Grosbeak	4/27–5/22	85	916	1,771	8/16–10/28	285	4,750	9,790
Indigo Bunting	4/19–6/06	97	497	861	7/19–10/28	124	273	363

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Maryland Christmas Bird Counts (122nd CBC) December 2021 through January 2022

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Twenty-five counts took place in Maryland this year (Table 1). Catoctin Mountain had the record minimum low temperature of 12 °F (-11 °C) for the count season. They also had the minimum high temperature of 32 °F (0 °C). The highest winds were at Jug Bay (up to 35 mph [56 km/h]), Point Lookout, and Seneca (both up to 30 mph [48 km/h]; with minimum winds of 15 mph [24 km/h] at Point Lookout), and St. Michaels close behind with winds up to 28 mph (45 km/h). No counts reported snow-covered ground, but two counts had light snow during count day. These were Jug Bay (morning) and Point Lookout (afternoon) which were both held on 19 December 2021.

Table 1. 2021–2022 Maryland Christmas Bird Counts: count names, survey dates, and compilers (primary compilers listed first).

Christmas Bird Count	Count Date	Compiler
Allegany County	18 DEC 2021	Mark Eanes
Catoctin Mountain	18 DEC 2021	Kathy Brown
Denton	18 DEC 2021	Steve Westre
Oakland	18 DEC 2021	Connie Skipper
Triadelphia Reservoir	18 DEC 2021	David W. Holmes
Elkton	19 DEC 2021	Russell Kovach
Jug Bay	19 DEC 2021	Marcia Watson
Lower Kent County	19 DEC 2021	Nancy Martin, Walter Ellison
Middle River	19 DEC 2021	Libby Errickson
Point Lookout	19 DEC 2021	Bob Boxwell
Port Tobacco	19 DEC 2021	Mike Callahan
St. Michaels	19 DEC 2021	Wayne Bell
Salisbury	19 DEC 2021	Mike Walsh
Seneca	19 DEC 2021	Jim Nelson
Washington County	21 DEC 2021	Mark Abdy
Chesterville	26 DEC 2021	Maren Gimpel
Rock Run	26 DEC 2021	Mark Johnson
Southern Dorchester County	26 DEC 2021	Bruce Peterjohn
Crisfield	27 DEC 2021	Paul Bystrak
Ocean City	28 DEC 2021	Mark Hoffman
Bowie	31 DEC 2021	David Mozurkewich
Annapolis-Gibson Island	02 JAN 2022	Hal Wierenga, Lynn Davidson, Sue Ricciardi
Loch Raven	02 JAN 2022	Libby Errickson
Patuxent River	02 JAN 2022	Andrew Brown
Sugarloaf Mountain	02 JAN 2022	Janet Millenson

Table 2 summarizes the the numbers of field counters, parties, party hours and miles, feeder counters and hours, and night hours and miles.

Table 2. 2021–2022 Maryland Christmas Bird Counts: summary. [*No data have been provided for the Port Tobacco count as of the writing of this report.*]

Christmas Bird Count	Count Date	Field Counters	Maximum Parties	Party Hours	Party Miles	Feeder Counters	Feeder Hours	Night Hours	Night Miles
Allegany County	18 DEC 2021	9	7	38.13	108.91				
Catoctin Mountain	18 DEC 2021	21	12	70	356		0	1.1	
Denton	18 DEC 2021	18	9	69.8	341.3	2	8	9	68.6
Oakland	18 DEC 2021	19	12	88	356	2	1.75	0.3	
Triadelphia Reservoir	18 DEC 2021	82	45	231.5	608.05	4	4	9.15	12.3
Elkton	19 DEC 2021	14	7	43.95	239.9	1	0.25	3.29	24.1
Jug Bay	19 DEC 2021	54	41	174.8	458.5	3	3.7	7.6	11.1
Lower Kent County	19 DEC 2021	19	11	91.5	319			6.5	37.7
Middle River	19 DEC 2021	32	24	92.1	196.26	1	1	0.25	
Point Lookout	19 DEC 2021	15	14	184.6	285.3				
Port Tobacco	19 DEC 2021								
St. Michaels	19 DEC 2021	57	22	135.7	374	9	8	10.4	96.1
Salisbury	19 DEC 2021	25	12	99.8	588.13				
Seneca	19 DEC 2021	146	66	231.75	465.24	18	48.25	0.5	0.25
Washington County	21 DEC 2021	23	25	59	266.5	6	3.5	2	1
Chesterville	26 DEC 2021	21	13	112.25	373.1			9.25	40.7
Rock Run	26 DEC 2021	33	15	115.4	244.6	3	31.5	6.15	
South Dorchester County	26 DEC 2021	12	10	83.5	222.75			4.75	11
Crisfield	27 DEC 2021	24	15	111.43	255.61			6.23	
Ocean City	28 DEC 2021	51	29	204.8	433.21		0	9.6	
Bowie	31 DEC 2021	73	37	251	565	1	9.3	15.6	
Annapolis-Gibson Island	02 JAN 2022	72	41	255	607	3	12	5	8.25
Loch Raven	02 JAN 2022	37	22	101.36	218.64	1	6		
Patuxent River	02 JAN 2022	21	13	70	313			6	20.5
Sugarloaf Mountain	02 JAN 2022	66	39	157.25	480	5	2.25	2.5	

Some of the more notable birds this year were a Little Blue Heron, Northern Shrike, Blue-gray Gnatcatcher, several warblers (Tennessee, Nashville, Cape May, Prairie, and Wilson's), Yellow-breasted Chat, and Lazuli Bunting (Tables 3 and 4). There was only one winter finch report (Red Crossbill) which is a surprise in a year with the only others being modest showings of Purple Finches but the Western Maryland crossbills ended up sticking around into spring and summer since the data were first submitted.

I use "hc" and "lc" codes in this report to identify "all-time" highs and lows rather than the compilers' or author's/editor's ideas of what constitutes a high or

low count but will also reference those as "near high" or "good number" or "lower than typical" (as examples). The "us" code (unusual species) is used only in the written section of the report and is used based on the judgement of the compilers and/or the author and editor.

Waterfowl: Bowie had 4 Greater White-fronted Geese (2nd occurrence); Ocean City also had a Greater White-fronted Goose. Patuxent River had 13 Atlantic Brant (hc; us). Rock Run had 24 (hc), Lower Kent County had 19, Sugarloaf Mountain had 14 (hc), and both Ocean City, and Triadelphia Reservoir had 6 Cackling Geese (not a hc for either count, but a good number). Seven other Maryland Counts had smaller numbers of Cackling Geese. Middle River had 4 Trumpeter Swans (us), while Bowie had 3, and Lower Kent County had one. Middle River had 90 Tundra Swans (hc). Crisfield had 64 (hc), Annapolis-Gibson Island had 61 (hc), and Seneca had 36 Wood Ducks (hc). Chesterville has missed Wood Duck but 1 was on the low side. Southern Dorchester County had 262 Northern Shovelers (close to the all-time high of 275). Middle River had 668 Gadwall (hc), and Loch Raven had 62 (hc). Middle River had 288 American Wigeon (hc). Loch Raven had 178 Mallards (hc). Middle River had 166 American Black Ducks (hc). Ocean City had 988 Green-winged Teal (hc). On the Ocean City Count, 43 Canvasbacks was on the low side and Annapolis-Gibson Island had an all-time low of 29 (lc). On the Oakland count, 6 Surf Scoters and 4 White-winged Scoters were both all-time highs (hc). Oakland had 9 Long-tailed Ducks (hc). Seneca had 1 Long-tailed Duck (us). Counts of Common Goldeneye were low on a few counts. St. Michaels had 37 (lowest in 66 counts; lc), Annapolis-Gibson Island had 5 (lc), Lower Kent County had 30 (lc; lowest in 63 counts), and Crisfield had only one but has probably been missed entirely only twice in 55 counts). Oakland had 440 (hc), Rock Run had 427 (hc), and Middle River had 351 (hc) Hooded Mergansers. Oakland had 169 Common Mergansers (hc), and Seneca had 71 (hc). Oakland had 71 Red-breasted Mergansers (hc); Seneca had Red-breasted Merganser for count week (us). Middle River had a high count of 6,359 Ruddy Ducks (hc).

Doves, Hummingbirds: Crisfield had 706 (hc) and Chesterville had 348 (hc), and Oakland had 135 Rock Pigeons (hc). Chesterville had 787 Mourning Doves (hc). Seneca had a Rufous Hummingbird 1 (us).

Rails, Cranes: Southern Dorchester County had 11 King Rails (near high; All-time high was 32 in count 75). Jug Bay had 2 Clapper Rails (us). Middle River had 13 Virginia Rails (hc). Middle River had 311 American Coots (hc). A single American Coot was considered low at Seneca (though it has been missed several times). Middle River had 38 Sandhill Cranes (not a count high). Jug Bay had 2 Sandhill Cranes (us).

Shorebirds: Jug Bay had a Black-bellied Plover and a Semipalmated Plover (both us). Jug Bay had 33 (hc; us), and Lower Kent County had 5 Least Sandpipers (hc; us). Elkton had 4 American Woodcocks (hc). An American Woodcock was also encountered on the Seneca count (us). Crisfield had 40 (hc), and Patuxent River had 7 Wilson's Snipe (hc). Salisbury had 21 Greater Yellowlegs (hc).

Gulls: Loch Raven had a Bonaparte's Gull (us), and Seneca had one for count week (us). Point Lookout had a Black-headed Gull (us). Loch Raven had 490 Ring-billed Gulls (hc). Jug Bay had 3 Lesser Black-backed Gulls (hc). Chesterville had 353 Herring Gulls (hc). Middle River had only 28 Great Black-backed Gulls (lc).

Gannets, Cormorants, Pelicans, Herons: Crisfield had a Northern Gannet (their 11th). Point Lookout had 19 Great Cormorants (hc) and 242 Double-crested Cormorants (hc) while Middle River had 90 Double-crested Cormorants (lc). Ocean City and Southern Dorchester County continue to host American White Pelicans (19 and 31 respectively) and this year Point Lookout had one for count week. Ocean City had 17 Brown Pelicans (hc). Oakland had 8 Great Blue Herons (hc). Great Egrets were 3 (hc) at Middle River, and 2 (us; hc; 2nd occurrence) at Patuxent River. Annapolis-Gibson Island also had a Great Egret (us). Crisfield had a Little Blue Heron (their 10th).

Vultures, Hawks, Eagles: Seneca had 665 (hc), Chesterville had 400 (hc), Crisfield had 271 (hc), and Elkton had 171 Black Vultures (hc). Seneca had 647 (hc), and Jug Bay had 538 Turkey Vultures (hc). Annapolis-Gibson Island had 2 Osprey's (10th occurrence). Loch Raven had 15 Cooper's Hawks (hc). Ocean City had 171 (hc), Crisfield had 154 (hc), St. Michaels had 124 (hc), Denton had 89 (hc) Bald Eagles. Sugarloaf Mountain had 84, Catoctin Mountain had 35, Patuxent River had 31, Crisfield had 18, and Salisbury had 17 Red-shouldered Hawks (all hc) while at Loch Raven 23 was an all-time low (lc). Oakland, and Southern Dorchester County each had a Rough-legged Hawk. Ocean City had one for count week.

Owls, Kingfisher: Denton had 24 Eastern Screech Owls (hc). Bowie had 26 Barred Owls (hc). Salisbury had 3 Short-eared Owls (hc). Jug Bay had 2 Northern Saw-whet Owls (hc; us). Oakland had 10 Belted Kingfishers (hc).

Woodpeckers: Seneca had 177, Bowie had 96, Triadelphia Reservoir had 89, Crisfield had 35 Yellow-bellied Sapsuckers (all hc). Southern Dorchester County had 11 Red-headed Woodpeckers (hc). Catoctin Mountain had 216 (hc), and Chesterville had 185 Red-bellied Woodpeckers (hc). Chesterville had 121 Downy Woodpeckers (hc). Loch Raven had 83 Downy Woodpeckers (lc). Chesterville had 42 Hairy Woodpeckers (hc). Bowie had 125, Triadelphia Reservoir had 110, Annapolis-Gibson Island had 61, Crisfield had 47,

Chesterville had 31 Pileated Woodpeckers (all hc). Sugarloaf Mountain had 236 Northern Flickers (hc).

Falcons: Two American Kestrels at Southern Dorchester County, and 1 at Rock Run was very low (have historically been missed only a few times on these counts). Crisfield had 6 (hc) and Bowie and Loch Raven each had 5 (both hc) Merlins. Oakland had a single Merlin (us; 1st occurrence). Bowie and Seneca each had 2 Peregrine Falcons (both hc).

Flycatchers, Vireos, Shrikes, Corvids: Chesterville had 11, Sugarloaf Mountain had 10, Point Lookout had 8, and Annapolis-Gibson Island had 7 Eastern Phoebes (all hc). Ocean City had 5 Blue-headed Vireos (hc; us) and they appeared on many other counts this year. Annapolis-Gibson Island, Southern Dorchester County, and Point Lookout (cw) each had a Blue-headed Vireo (us; 1st occurrence for Southern Dorchester County). Triadelphia Reservoir had a Northern Shrike (us). Loch Raven had 259 Blue Jays (hc). Loch Raven had 196 (hc) and Middle River had 22 Fish Crows (lc). Triadelphia Reservoir had 20 Common Ravens (hc); Annapolis-Gibson Island had 5 Common Ravens (hc).

Chickadees, Nuthatches, Creeper, Wrens: The Allegany County count had a Carolina Chickadee (singing the "fee-bee-fee-bay" song) in the southern part of the count circle (in WV). Chesterville had 344 Carolina Chickadees (hc). Oakland had 457 Black-capped Chickadees (hc). Oakland had 184 Tufted Titmice (hc). Loch Raven had 5 Horned Larks (hc). Middle River had a good representation of swallows (all well documented): not just a Tree Swallow (us), but a Northern Rough-winged (us) and Barn Swallow (us), as well. Chesterville had 123 (hc), Patuxent River had 48 Ruby-crowned Kinglets (hc). Chesterville had 90 Golden-crowned Kinglets (hc). Triadelphia Reservoir had 308 (hc), and Oakland had 137 White-breasted Nuthatches (hc). Chesterville had 51 (hc), and Oakland had 26 Brown Creepers (hc). At Rock Run, 2 Brown Creepers was a low count (lc; lowest in 58 counts). Southern Dorchester County had a Blue-gray Gnatcatcher (1; us; 4th occurrence). Bowie and Sugarloaf Mountain each had 4 House Wrens (both hc). Jug Bay had 1 House Wren (us). Chesterville had 42 Winter Wrens (hc). Middle River had a Sedge Wren (us; 1st occurrence). Crisfield had 114 Marsh Wrens (hc). Bowie had 754 (hc), Sugarloaf Mountain had 500 (hc), and Catoctin Mountain had 201 Carolina Wrens (hc).

Mimids, Starlings, Thrushes, Finches: Chesterville had 20 Gray Catbirds (hc). Elkton and Loch Raven each had 5 (both hc) and Sugarloaf Mountain had 3 Brown Thrashers (hc). Loch Raven had 682 European Starlings (lc). Triadelphia Reservoir had 617 (hc), Annapolis-Gibson Island had 460 (hc), Chesterville had 310 (hc), and Oakland had 43 Eastern Bluebirds (hc). Chesterville had 123, Triadelphia Reservoir had 103, Sugarloaf Mountain had 57, Rock Run had 53, and Catoctin Mountain had 15 Hermit Thrushes (all hc). Oakland had 26

American Robins (hc). Oakland had 124 Cedar Waxwings (hc). Elkton had 38 House Sparrows (lc; lowest in 57 counts). Oakland had 9 Red Crossbills (us). Loch Raven had 61 and Elkton had only 10 American Goldfinches (both lc).

Sparrows, Towhee: Washington County (us; 1st occurrence) and Ocean City (us; 4th occurrence) each had a Grasshopper Sparrow. Several counts had higher than normal numbers of Chipping Sparrows. Ocean City had 555 Chipping Sparrows (close to the all-time high of 599). Point Lookout had 110, Jug Bay had 92, Seneca had 81, Sugarloaf Mountain had 65, Lower Kent County had 63, Rock Run had 33, and Patuxent River had 32 Chipping Sparrows (all hc). Five Chipping Sparrows at Loch Raven was a count low (lc). Chesterville had 432 Field Sparrows (hc). Loch Raven had 31 Field Sparrows (lc). Southern Dorchester County had 25 Dark-eyed Junco (considered low). Oakland had 58 White-crowned Sparrows (hc). Chesterville had a Gambel's White-crowned Sparrow. Chesterville had 3,184 and Oakland had a high count of 48 White-throated Sparrows (both hc). Chesterville had 1,981 Song Sparrows (hc). Chesterville had 2 Lincoln's Sparrows (hc). Sugarloaf Mountain had 59 (hc), Catoctin Mountain had 22 (hc), and Washington County had 4 Eastern Towhees (hc).

Chat, Blackbirds, Orioles: Ocean City had a Yellow-breasted Chat (us). Loch Raven had 17 Eastern Meadowlarks (hc). Denton, Lower Kent County, and Triadelphia Reservoir (us; 8th occurrence) each had a Baltimore Oriole (us) and Annapolis Gibson Island had one for count week. Middle River had 4,594 (hc), and Oakland had 321 Red-winged Blackbirds (hc). Jug Bay had 3,605 (hc), Chesterville had 703 (hc), and Patuxent River had 454 (hc), and Loch Raven had 199 Brown-headed Cowbirds (hc). Lower Kent County had 10 Common Grackles (lc).

Warblers: Chesterville had a Tennessee Warbler (us). Ocean City had 10 Orange-crowned Warblers (not an all-time count high). Middle River had 3 Orange-crowned Warblers (hc). Annapolis-Gibson Island had an Orange-crowned Warbler (of note; but it was their 9th) and Chesterville, Rock Run, and Seneca also each had an Orange-crowned Warbler. Point Lookout turned up an Orange-crowned Warbler during count week. Middle River had a Nashville Warbler (us). Middle River had a Common Yellowthroat (us). The Sugarloaf Mountain count had a Cape May Warbler (us). Middle River had 2 Palm Warblers (hc). Chesterville also had an abnormally high count of 35 Palm Warblers (21 Yellow; 13 Western; 1 undetermined). Catoctin Mountain had 66 Yellow-rumped Warblers (hc). Annapolis-Gibson Island had 1 each Palm and Pine Warblers. Ocean City had a Prairie Warbler (us). Point Lookout had a Wilson's Warbler (us; cw).

Grosbeaks, Buntings: Denton had 506 Northern Cardinals (hc). Loch Raven had a Lazuli Bunting (us).

Table 3. 2021–2022 Maryland Christmas Bird Counts: Inland counts.
(bolded species name = unusual for the Maryland counts; bolded number = high count record; cw = count week)

Species	Oakland	Allegany County	Washington County	Catoctin Mountain	Sugarloaf Mountain	Seneca	Triadelphia Reservoir	Loch Raven	Rock Run	Bowie	Elkton	Chesterville
Snow Goose	cw		1						2	1		2151
Ross's Goose												
Greater White-fronted Goose										**4**		
Brant												
Cackling Goose					**14**		6		**24**		1	
Canada Goose	1092	656	607	864	6457	2647	5965	5631	7589	7427	2135	22187
Mute Swan									6			1
Trumpeter Swan										3		
Tundra Swan	22								40		1852	49
swan sp.												
Wood Duck		4	1		4	**36**	2		8	43	3	1
Blue-winged Teal												
Northern Shoveler						9				4	1	7
Gadwall	41		12		2	30	1	62	35	22		107
American Wigeon	6	1			1	37		126		1		12
Mallard	560	74	272	56	157	518	301	**178**	686	606	393	919
Mallard (domestic type)												
Mallard x Am. Black Duck		1			14					4		
American Black Duck	39	15	18	5	39	14	20	59	67	24	9	292
Northern Pintail	13		6		2	8				16		4
Green-winged Teal	34		7		2	22	20	1	11	25	16	9
Canvasback									2		12	
Redhead	13	5						6			7	
Ring-necked Duck	164	7			49	441	56	511	77	529	54	283
Greater Scaup	9											
Lesser Scaup	28	1				2			634	1	26	4
Greater/Lesser Scaup	140								70		1250	
Aythya sp.												
Common Eider												
Surf Scoter	**6**											
White-winged Scoter	**4**											
Black Scoter												
scoter sp.												
Long-tailed Duck	**9**					1		cw				
Bufflehead	169		4		32	301	43	34	771	16	27	8
Common Goldeneye	3					3			12			3
Hooded Merganser	**440**	6			27	104	79	127	**427**	183	60	84
Common Merganser	**169**	31	31	3	24	**71**	575	50	138		58	55
Red-breasted Merganser	**71**					cw	1					
Ruddy Duck	100				2	1	32		1755	2	214	

Species	Oakland	Allegany County	Washington County	Catoctin Mountain	Sugarloaf Mountain	Seneca	Triadelphia Reservoir	Loch Raven	Rock Run	Bowie	Elkton	Chesterville
duck sp.						3		16				
Northern Bobwhite												28
Wild Turkey	29	29	19	8	1	26	8		1	41	6	2
Ring-necked Pheasant								1				
Pied-billed Grebe	2		5		6	6	8	61	31	11	1	1
Horned Grebe	3						8	7	1			
Rock Pigeon	**135**	411	391	282	328	347	128	107	228	94	25	**348**
Mourning Dove	60	117	537	320	557	452	742	321	45	960	71	**787**
Rufous Hummingbird						1						
King Rail												
Clapper Rail												
Virginia Rail									2			
Rallus sp.												
Sora									1			
American Coot						1		341	34	3	32	
Sandhill Crane	1					2						
American Oystercatcher												
Black-bellied Plover												
Killdeer			1		1	1	21		37	12		2
Semipalmated Plover												
Marbled Godwit												
Ruddy Turnstone												
Red Knot												
Sanderling												
Dunlin												
Purple Sandpiper												
Least Sandpiper												
American Woodcock						1			3	10	**4**	3
Wilson's Snipe	cw			1						23		
Lesser Yellowlegs												
Willet												
Greater Yellowlegs												
Razorbill												
Bonaparte's Gull	1					cw	5	1	15			
Black-headed Gull												
Laughing Gull									1			
Ring-billed Gull	cw	23			12	669	51	**490**	4752	319	580	269
Herring Gull					54	9		8	258	4	353	**353**
Lesser Black-backed Gull												
Great Black-backed Gull									258		123	
gull sp.						75		10	200	40		
Black Skimmer												
Red-throated Loon												
Common Loon	1					cw						
Northern Gannet												

Species	Oakland	Allegany County	Washington County	Catoctin Mountain	Sugarloaf Mountain	Seneca	Triadelphia Reservoir	Loch Raven	Rock Run	Bowie	Elkton	Chesterville
Great Cormorant												
Double-crested Cormorant						7	4	1	70	1	9	15
American White Pelican												
Brown Pelican												
American Bittern												
Great Blue Heron	**8**	6	15	21	27	58	31	18	148	33	42	30
Great Egret								1				
Little Blue Heron												
Black-crowned Night-Heron									10			
Black Vulture		66	17	27	130	**665**	348	162	325	349	**171**	**400**
Turkey Vulture		8	122	79	272	**647**	267	101	257	124	232	533
New World vulture sp.						15						
Osprey												
Golden Eagle												
Northern Harrier		1	1	4	6	4	4		5	7	2	18
Sharp-shinned Hawk	2	3	3		3	6	6	5	5	8	4	16
Cooper's Hawk	5	3	4	2	7	13	10	**15**	7	11	3	7
Sharp-shinned/Cooper's Hawk												
Accipiter sp.				1		1				2		4
Bald Eagle	4	12	2	18	10	48	51	29	96	44	44	116
Red-shouldered Hawk	2	5	23	**35**	**84**	75	90	23	13	68	5	19
Red-tailed Hawk	18	9	27	45	59	45	33	13	22	39	17	53
Rough-legged Hawk	1											
Buteo sp.					1			1				
Barn Owl												
Eastern Screech-Owl	2	5	cw		3	cw	4		1	1	1	15
Great Horned Owl		cw	1		6	1	9	3	4	7		32
Barred Owl	2		cw	1	6	7	6	2	2	**26**		18
Short-eared Owl				3			2					
Northern Saw-whet Owl												
Belted Kingfisher	**10**	7	9	11	35	34	26	17	30	38	2	14
Red-headed Woodpecker	2			13	8	10				14		
Red-bellied Woodpecker	32	59	108	**216**	323	478	416	112	92	403	75	**185**
Yellow-bellied Sapsucker	2	19	32	51	93	**177**	**89**	21	30	**96**	12	43
Downy Woodpecker	64	54	50	89	187	370	311	83	76	281	38	**121**
Hairy Woodpecker	31	9	8	20	50	55	43	25	15	74	6	**42**
Northern Flicker (Yellow-shafted)	cw	39	36	77	**236**	267	284	107	42	341	56	142
Pileated Woodpecker	14	44	28	23	78	121	**110**	33	13	**125**	6	**31**
American Kestrel	6	4	11	21	9	8	3		1	7		19
Merlin	1	1			3	2	3	**5**		**5**		2
Peregrine Falcon				1		**2**		1	1	**2**	1	
Eastern Phoebe		1	1	3	**10**	9	7		2	7		**11**
Blue-headed Vireo												
Northern Shrike							1					
Blue Jay	194	74	128	215	484	379	523	**259**	202	1014	103	290

Species	Oakland	Allegany County	Washington County	Catoctin Mountain	Sugarloaf Mountain	Seneca	Triadelphia Reservoir	Loch Raven	Rock Run	Bowie	Elkton	Chesterville
American Crow	1478	241	161	184	550	2172	3667	635	202	1949	246	141
Fish Crow				21	272	1033	658	**196**	16	609	129	
crow sp.			14	9	367	1567	2608	547	30	2390		
Common Raven	34	28	11	32	11	15	**20**	2	4	7		
Carolina Chickadee		**1**	178	180	370	561	493	191	176	543	75	**344**
Black-capped Chickadee	**457**	59										
Tufted Titmouse	**184**	92	101	138	231	357	367	123	86	391	43	191
Horned Lark			8	109	23	13		**5**	2			450
Tree Swallow												
Northern Rough-winged Swallow												
Barn Swallow												
Ruby-crowned Kinglet		2	3	14	27	88	15	5	52	49	22	**123**
kinglet sp.												
Golden-crowned Kinglet	24	14	34	19	34	97	41	13	61	105	15	**90**
Cedar Waxwing	**124**		50	75	517	887	287	140	150	304	36	34
Red-breasted Nuthatch	12		2		2	2	1	4	4	13		6
White-breasted Nuthatch	**137**	89	56	133	203	310	**308**	120	54	219	27	60
Brown-headed Nuthatch												
Brown Creeper	**26**	2	9	18	22	89	36	9	2	30	9	**51**
Blue-gray Gnatcatcher												
House Wren					**4**		1			**4**		1
Winter Wren	3	6	5	16	28	56	40	4	29	66	14	**42**
Sedge Wren												
Marsh Wren					1				1			
Carolina Wren	49	106	122	**201**	**500**	496	499	172	163	**754**	90	344
Gray Catbird	1			1	1	4	7	3	5	9	5	**20**
Brown Thrasher	2				**3**		5	**5**	6	11	**5**	28
Northern Mockingbird		27	58	114	179	97	176	59	61	230	43	163
European Starling	461	943	1440	4488	2346	2341	3333	682	847	6844	980	2237
Eastern Bluebird	**43**	83	163	123	506	771	**617**	174	188	431	78	**310**
Hermit Thrush	2	6	5	**15**	**57**	44	**103**	11	**53**	162	10	**123**
American Robin	**26**	46	453	339	1043	1434	4062	387	264	4761	217	1402
House Sparrow	194	93	136	278	246	232	550	176	178	735	38	211
American Pipit				40	39				1	5		295
House Finch	69	9	151	107	203	214	211	98	45	253	28	104
Purple Finch	25		2	2	7	3	1	3		20		2
Red Crossbill	9											
Pine Siskin	1		1			cw		4				
American Goldfinch	87	31	46	124	165	188	242	61	70	156	10	124
Lapland Longspur												1
Snow Bunting												
Grasshopper Sparrow			1									
Chipping Sparrow					**65**	**81**	19	5	**33**	24		27
Field Sparrow	2	30	3	20	76	53	93	31	35	130	8	**432**
Fox Sparrow	1			3	13	10	45	7	8	77	2	60

Species	Oakland	Allegany County	Washington County	Catoctin Mountain	Sugarloaf Mountain	Seneca	Triadelphia Reservoir	Loch Raven	Rock Run	Bowie	Elkton	Chesterville
American Tree Sparrow	13		cw		8	5			3	1	4	
Dark-eyed Junco (Slate-colored)	435	257	219	802	523	1023	1069	293	311	1625	457	985
White-crowned Sparrow	**58**	9	4	28	52	13	17	4	1	19		86
Wh.-crowned Sparrow (Gambel's)												1
White-throated Sparrow	**48**	196	227	807	1666	2559	3203	1596	998	4213	604	**3184**
Seaside Sparrow												
Nelson's Sparrow												
Saltmarsh Sparrow												
Nelson's/Saltmarsh Sparrow (Sharp-tailed Sparrow)												
Savannah Sparrow (Savannah)												
Savannah Sparrow (Ipswich)												
Song Sparrow	88	117	56	306	572	592	833	376	269	1172	106	**1981**
Lincoln's Sparrow												**2**
Swamp Sparrow	15	12		7	88	61	25	13	45	206	14	180
Eastern Towhee	2	1	**4**	**22**	**59**	42	102	69	47	184	14	127
sparrow sp.					35	27						
Yellow-breasted Chat												
Eastern Meadowlark		1		12	8	1	1	**17**		76		6
Baltimore Oriole							1					
Red-winged Blackbird	**321**	14		124	333	355	1125	896	1226	3928	5746	15480
Brown-headed Cowbird				58	202	11	5060	**199**	80	170	174	**703**
Rusty Blackbird	6					62		3	36			5
Common Grackle			6	10	42	2	249	567	5447	29771	5829	23314
Boat-tailed Grackle												
blackbird sp.						180			22000	1820		5050
Tennessee Warbler												1
Orange-crowned Warbler						1			1			1
Nashville Warbler												
Common Yellowthroat									1			1
Cape May Warbler					1							
Palm Warbler												**1**
Palm Warbler (Western)												**13**
Palm Warbler (Yellow)									1			**21**
Pine Warbler						1			1			2
Yellow-rumped Warbler (Myrtle)		17	28	**66**	103	312	44		39	88	64	185
Prairie Warbler												
Wilson's Warbler												
Northern Cardinal	145	202	279	304	687	816	912	312	225	956	151	612
Lazuli Bunting								1				

Table 4. 2021–2022 Maryland Christmas Bird Counts: Tidewater counts. (bolded species name = unusual for the Maryland counts; bolded number = high count record; cw = count week) [*No data have been provided for the Port Tobacco count as of the writing of this report.*]

Species	Middle River	Annapolis-Gibson Island	Patuxent River	Jug Bay	Point Lookout	Lower Kent County	Denton	Port Tobacco	St. Michaels	Southern Dorchester County	Crisfield	Salisbury	Ocean City
Snow Goose				1	cw	967	75			2236	485		27050
Ross's Goose						1							1
Greater White-fronted Goose													1
Brant			13										866
Cackling Goose		1	2	3	2	19			4			1	6
Canada Goose	1712	5365	4349	7477	1705	23471	2267		26130	8039	1112	4136	15029
Mute Swan						2							
Trumpeter Swan	4			4		1							
Tundra Swan	**90**	303	26	89	8	717	10		260	468	83	39	615
swan sp.				3									
Wood Duck		**61**	5	8		9	10		2	21	**64**	16	54
Blue-winged Teal	5					1					22		1
Northern Shoveler	125	5		5		325			7	262			69
Gadwall	**668**	40	26	48		268			20	14	32	5	112
American Wigeon	**288**	1				61	2		12	3	7		125
Mallard	778	825	166	662	8	2169	278		240	1428	121	237	1298
Mallard (domestic type)	4			3									
Mallard x Am. Black Duck										1			6
American Black Duck	**166**	37		501	15	582	10		15	318	156	72	1879
Northern Pintail	288			34		51			cw	704	2	3	65
Green-winged Teal	52			137		819	7		cw	80	47	2	**988**
Canvasback		29		1		307							43
Redhead		2			58	1							21
Ring-necked Duck	316	13	1	175		560	32		1	153	2	5	195
Greater Scaup	22	2325	1	9	17	290							1
Lesser Scaup	334	637		16	44	1439	2		12	20		7	54
Greater/Lesser Scaup	5738	1025		30	10	653				130			
Aythya sp.													170
Common Eider													4
Surf Scoter		126		57	135	48			51	9	202		312
White-winged Scoter		3		cw	3								4
Black Scoter		5		1	410	4			4				1003
scoter sp.													1491
Long-tailed Duck	1	116	57	15	103	22			45		20		31
Bufflehead	102	2302	442	306	397	620			2049	99	656	21	2270
Common Goldeneye	5	5	44	3	21	30			37	10	1	1	
Hooded Merganser	**351**	131	25	13	14	45	15		23	71	129	32	321
Common Merganser	16			22		2	1		1	7			

Species	Middle River	Annapolis-Gibson Island	Patuxent River	Jug Bay	Point Lookout	Lower Kent County	Denton	Port Tobacco	St. Michaels	Southern Dorchester County	Crisfield	Salisbury	Ocean City
Red-breasted Merganser	20	5	12	1	9	10			2		5	6	169
Ruddy Duck	**6359**	1436	2491	2	2	3207	29		1106	1330	60	60	31
duck sp.	502												
Northern Bobwhite												12	
Wild Turkey	8			2	2	25	12		96			36	4
Ring-necked Pheasant						2							
Pied-billed Grebe	19	10	2	5		1	1		cw	3	1	9	33
Horned Grebe	2	4	7	2	18	2			6	5			34
Rock Pigeon	191	41	73	109	50	52	152		32		**706**	158	305
Mourning Dove	214	351	243	284	81	205	620		259	33	469	327	433
Rufous Hummingbird													
King Rail										11	5		
Clapper Rail				2	5						45		3
Virginia Rail	**13**	10		9		1				25	56	2	14
Rallus sp.										4	5		
Sora		1		cw							7		
American Coot	**311**	29								1		6	12
Sandhill Crane	38			2									
American Oystercatcher													28
Black-bellied Plover				1									92
Killdeer	4	1	3	53	108	4	57		45	13	13	51	33
Semipalmated Plover				1									5
Marbled Godwit													1
Ruddy Turnstone													41
Red Knot													1
Sanderling					1						1		343
Dunlin									cw	95	98		1847
Purple Sandpiper				7									1
Least Sandpiper				**33**		5					21		
American Woodcock	1	2		1	4	1	3		1	3	1	3	5
Wilson's Snipe			**7**		1				cw	4	**40**	1	5
Lesser Yellowlegs				1						10	15		
Willet													1
Greater Yellowlegs				cw						33	134	**21**	37
Razorbill													2
Bonaparte's Gull					77				1				6
Black-headed Gull					1								
Laughing Gull	33			14	cw	3							2
Ring-billed Gull	2674	437	1696	2344	853	1061	355		369	574	2305	370	3629
Herring Gull	361	124	191	1129	155	36	50		505	129	1692	230	1112
Lesser Black-backed Gull				**3**									4
Great Black-backed Gull	28	86	9	80	113	9	1		21	1	12	38	181
gull sp.	307	11		169					120			738	
Black Skimmer													cw
Red-throated Loon		2		cw	78	1			1		1		402
Common Loon	1	4	39	3	51	6			30	6	9	1	122

Species	Middle River	Annapolis-Gibson Island	Patuxent River	Jug Bay	Point Lookout	Lower Kent County	Denton	Port Tobacco	St. Michaels	Southern Dorchester County	Crisfield	Salisbury	Ocean City
Northern Gannet				2	50				11		1		345
Great Cormorant			2		**19**								2
Double-crested Cormorant	90	3778	935	56	**242**	67	8		12		2	68	75
American White Pelican					cw					31			19
Brown Pelican			2		18								**17**
American Bittern											1		1
Great Blue Heron	50	117	23	54	32	56	19		38	77	84	31	99
Great Egret	**3**	1	**2**							1	3		
Little Blue Heron											1		
Black-crowned Night-Heron									cw	3	18		30
Black Vulture	89	302	62	593	36	179	69		177	56	**271**	98	198
Turkey Vulture	126	214	118	**538**	176	651	295		455	231	340	576	999
New World vulture sp.													
Osprey		2							1				
Golden Eagle						1				2			
Northern Harrier	5		2	27	4	17	3		7	33	46	12	18
Sharp-shinned Hawk	2	10	2	8	2	9	2		11	4	5	5	10
Cooper's Hawk	6	10	3	4	2	5	5		3	5	9	7	10
Sharp-shinned/Cooper's Hawk					1								
Accipiter sp.				1								1	
Bald Eagle	70	68	36	120	29	171	**89**		**124**	129	**154**	71	**171**
Red-shouldered Hawk	21	36	**31**	28	10	7	13		2	6	**18**	**17**	17
Red-tailed Hawk	15	21	9	11	3	28	18		22	17	29	21	25
Rough-legged Hawk										1			cw
Buteo sp.													
Barn Owl				4						1			
Eastern Screech-Owl		4	6	4	2	20	**24**		22	15	36	16	30
Great Horned Owl	1	8	6	2	4	4	10		9	12	23	5	17
Barred Owl	1	5	4	10	1	cw	9		2	1	3		4
Short-eared Owl			1			cw			cw	3	2	**3**	
Northern Saw-whet Owl				**2**					1				1
Belted Kingfisher	13	59	8	18	13	15	8		17	14	26	17	34
Red-headed Woodpecker		1	2	25	2	3				**11**	1	2	2
Red-bellied Woodpecker	68	321	70	179		107	60		56	39	60	55	83
Yellow-bellied Sapsucker	22	85	27	58	8	37	27		23	6	**35**	20	22
Downy Woodpecker	81	262	41	97	20	44	35		60	39	107	41	82
Hairy Woodpecker	9	46	5	23	5	18	10		2	4	20	8	29
Northern Flicker (Yellow-shafted)	57	151	67	113	23	95	58		69	48	94	71	133
Pileated Woodpecker	16	**61**	11	33	11	5	20		11	22	**47**	14	43
American Kestrel	1	1	10	4	12	12	10		5	2	16	16	21
Merlin	2	2	1	1		1			1	2	**6**		3
Peregrine Falcon	1	3				2			cw				4
Eastern Phoebe	4	**7**	3	6	**8**	2	3		2	8	12	7	33
Blue-headed Vireo		1		cw	cw					1	6		**5**
Northern Shrike													

Species	Middle River	Annapolis-Gibson Island	Patuxent River	Jug Bay	Point Lookout	Lower Kent County	Denton	Port Tobacco	St. Michaels	Southern Dorchester County	Crisfield	Salisbury	Ocean City
Blue Jay	121	751	140	183	41	172	116		132	40	83	53	88
American Crow	163	558	206	899	173	121	181		216	182	530	255	361
Fish Crow	22	130	1	101	9	2	9		2	498	143	57	99
crow sp.	29	53		117	3				11	2340	133	23	41
Common Raven	1	**5**		1									
Carolina Chickadee	164	548	160	161	90	133	120		224	174	305	184	402
Black-capped Chickadee													
Tufted Titmouse	91	424	130	160	39	54	67		109	34	95	79	132
Horned Lark				14		93	59		8		2		146
Tree Swallow	1									3	52		15
N. Rough-winged Swallow	1												
Barn Swallow	1												
Ruby-crowned Kinglet	31	40	**48**	25	39	28	10		33	53	59	26	29
kinglet sp.		1											
Golden-crowned Kinglet	29	29	37	23	37	16	40		32	58	93	80	127
Cedar Waxwing	115	1551	404	280	6	298	109		580	35	39	97	156
Red-breasted Nuthatch	2	5		2					2		1		1
White-breasted Nuthatch	33	177	16	86		13	28		8	5	2	3	8
Brown-headed Nuthatch			12		62	8			16	112	120	9	29
Brown Creeper	15	10	8	19	12	16	8		14	29	24	21	22
Blue-gray Gnatcatcher										1			
House Wren	1	3		1					1	2	8	1	14
Winter Wren	15	33	2	23	10	11	9		10	29	40	15	43
Sedge Wren	1				2						22		2
Marsh Wren	1	1		2						18	**114**		4
Carolina Wren	145	626	137	234	76	136	88		126	105	206	95	382
Gray Catbird	10	34	9	19	3	5	4		5	13	29	7	47
Brown Thrasher	8	34	2	9	11	8	11		10	6	23	9	19
Northern Mockingbird	50	171	63	66	27	80	66		93	25	82	40	128
European Starling	4500	2770	544	2089	268	3833	1567		1652	1141	3420	1726	9320
Eastern Bluebird	71	**460**	121	361		221	144		463	108	233	196	312
Hermit Thrush	23	150	25	80	50	39	48		35	27	63	39	52
American Robin	1211	5500	1111	5049	80	1192	707		1338	274	371	870	4577
House Sparrow	101	337	101	48		21	154		53	4	43	28	338
American Pipit		3	1	1	4	265	360			1	4		146
House Finch	111	364	133	98	12	61	57		126	9	37	25	175
Purple Finch	1	1		cw	2	8	3		cw				2
Red Crossbill													
Pine Siskin		4			1								
American Goldfinch	50	205	46	63	51	30	76		97	74	59	137	108
Lapland Longspur													2
Snow Bunting						1							9
Grasshopper Sparrow													1
Chipping Sparrow	1	40	**32**	**92**	**110**	**63**	24		57	27	123	155	555
Field Sparrow	39	31	10	22	38	48	19		5	6	21	40	67

Species	Middle River	Annapolis-Gibson Island	Patuxent River	Jug Bay	Point Lookout	Lower Kent County	Denton	Port Tobacco	St. Michaels	Southern Dorchester County	Crisfield	Salisbury	Ocean City
Fox Sparrow	20	22	4	15	22	23	5		8	6	24	25	26
American Tree Sparrow				3									
Dark-eyed Junco (Slate-colored)	254	714	400	958	155	370	307		730	25	237	528	420
White-crowned Sparrow		7		1	1	2			1				1
Wh.-crowned Sparrow (Gambel's)													
White-throated Sparrow	930	2383	639	1707	251	1710	681		611	189	545	1020	1508
Seaside Sparrow											15		1
Nelson's Sparrow											1		1
Saltmarsh Sparrow											1		7
Nelson's/Saltmarsh Sparrow (Sharp-tailed Sparrow)													1
Savannah Sparrow (Savannah)													292
Savannah Sparrow (Ipswich)													14
Song Sparrow	316	259	153	353	100	349	175		194	329	390	344	844
Lincoln's Sparrow													
Swamp Sparrow	81	45	22	51		160	21		36	169	233	79	236
Eastern Towhee	15	120	19	69	8	49	21		7	15	26	27	42
sparrow sp.	25										15		
Yellow-breasted Chat													1
Eastern Meadowlark			34	6	101	18			45	152	159	57	410
Baltimore Oriole		cw				cw	1						
Red-winged Blackbird	**4594**	5912	5400	10284	231	8120	690		1601	4210	5019	1372	2740
Brown-headed Cowbird	173	446	**454**	**3605**	cw	1224	210		60	88	23	9	1537
Rusty Blackbird			1	41		2				1			
Common Grackle	1412	6913	20068	14343	167	10	5220		176	1100	704	1001	77
Boat-tailed Grackle										18	167		
blackbird sp.	823	2564		225			100				500	215	
Tennessee Warbler													
Orange-crowned Warbler	**3**	1			cw	1							10
Nashville Warbler	1												
Common Yellowthroat	1		1	cw						1	5	1	2
Cape May Warbler													
Palm Warbler	**2**	1		cw	9	1			1	4	23	13	7
Palm Warbler (Western)													6
Palm Warbler (Yellow)													9
Pine Warbler		1			11	1	2		6	2	5	2	6
Yellow-rumped Warbler (Myrtle)	36	251	187	204	296	209	106		772	275	593	127	1503
Prairie Warbler													1
Wilson's Warbler					cw								
Northern Cardinal	233	974	247	280		337	**506**		262	51	158	213	323
Lazuli Bunting													

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2022 Maryland Mid-winter Bird Count

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The 2022 Maryland Mid-winter Bird Count was held between 3 January and 5 February over 15 dates. Data were submitted for Chesapeake and Ohio Canal National Historic Park (C&O), Fred J. Archibald Audubon Sanctuary (FAAS), Audrey Carroll Audubon Sanctuary (ACAS), as well as Frederick, Carroll, Howard, and Kent Counties (Table 1).

The C&O locations include the District of Columbia plus the four counties in Maryland bordering the Park's towpath. Overall C&O towpath coverage was 84.8% with county coverage as follows: DC - 100%; Montgomery - 92%; Frederick - 94%; Washington - 80%; Allegany - 66%. Data were submitted for each of the nine count days. Additional C&O count compilation information can be found on eBird at: https://ebird.org/tripreport/33349.

Table 1. 2022 Maryland Mid-winter Bird Count: Participating counties, codes, dates, and compilers.

County	Code	Date	Compiler(s)
Chesapeake and Ohio Canal National Historic Park	C&O	22–30 JAN 2022 (9 days)	James Speicher, Josephine Cox
Fred J. Archibald Audubon Sanctuary	FAAS	08 JAN 2022	David Smith
Audrey Carroll Audubon Sanctuary	ACAS	03 JAN 2022	David Smith
Frederick	FR	30 JAN 2022	David Smith
Carroll	CA	15 JAN 2022	Bill Ellis
Howard	HO	05 FEB 2022	Joe Hanfman
Kent	KE	30 JAN 2022	Walter Ellison, Nancy Martin

On the 2022 Mid-winter Bird Count, 114 species and 109,405 individual birds were observed by 154 parties and 192 observers (Table 2). Over the course of the count for all areas, 371.76 mi (598.3 km) of walking over 398.73 hours were logged; there were 1,725.3 mi (2,776.6 km) of driving over 177.89 hours reported by Frederick, Carroll, Howard, and Kent Counties. For owling, 13.12 hours were logged over 62.8 mi (101.1 km). Participants logged 30.35 hours and

6.0 hours while feeder-observing and stationary-observing, respectively. Compared to 2021, there was a decline from 163 parties and 211 observers.

Table 2. 2022 Maryland Mid-winter Bird Count: Summary.

	C&O	FAAS	ACAS	FR	CA	HO	KE	Total
Total Species	83	47	40	86	71	87	81	114
Total Birds	21,867	1,532	406	29,145	10,784	23,724	21,947	109,405
Start Time		0619	0629				0655	
Stop Time		1340	1225				1755	
Number of Parties	61	1	1	22	17	51	1	154
Number of Observers	57	4	3	36	21	69	2	192
Hours Driving				82.89	34	56.0	5	177.89
Miles Driving				816	367	519.3	23	1,725.3
Hours Walking	173.45	7.35	5.77	43.13	37	135.4	5	398.73
Miles Walking	156.5	5.44	5.61	35.61	34.2	132.9	1.5	371.76
Hours Owling		0.47	0.3	6.24	2.7	3.5	0	13.12
Miles Owling				51.5	5	6.3	0	62.8
Feeder Hours				8.55	1.3	20.5	0	30.35
Stationary Hours						6.0		6

For C&O, the first, sixth, and last days saw the coldest morning temperatures of the count period. Afternoon temperatures never reached 32 °F (0 °C) on four of the nine days with light snow, the only precipitation occurring on the seventh day. Calm predominated over the period with winds rarely exceeding 10 mph (16 km/h) until the eighth day when strong north/northwest winds occurred in all areas. Snow cover was minimal to the east with 4–7 in (10–18 cm) in parts of Allegany County. Where water was present in the canal, it was mostly frozen, while on the Potomac River, ice floes were widely reported. The Potomac River level fluctuated little and averaged 2.49 ft (0.8 m) [USGS monitoring location 01638500 Potomac River at Point of Rocks, MD] during the count period. Water conditions were clear.

The weather conditions for the two Frederick County sanctuary counts were 1 in (2.5 cm) of light snow, temperatures of 28–32 °F (-2–0 °C), and northwest winds of 5–15 mph (8–24 km/h) at ACAS; and clear with 0.5 in (1.3 cm) of snow, temperatures of 14–31 °F (-10 – -0.6 °C), and northwest winds of 3–5 mph (5–8 km/h) at FAAS.

Frederick County was clear to partly cloudy with temperatures 16–28 °F (-9 – -2 °C) with frozen ponds and streams.

Kent County reported, "recent snow put many birds onto the road shoulders, but this was counterbalanced by a lot of the smaller bodies of fresh water being frozen which lowered the waterfowl numbers and diversity."

Howard County counters experienced a cold and partially cloudy day with temperatures 25–29 °F (-4 – -2 °C) and no precipitation. The ponds were 50% frozen and rivers were free flowing.

Avian highlights this year included five Greater White-fronted Geese reported in Frederick (4) and Kent (1), two Long-tailed Ducks and a Horned Grebe at C&O, Wilson's Snipe in Frederick and Kent, a juvenile Golden Eagle in Kent, three Short-eared Owls in Frederick, and a Baltimore Oriole and Painted Bunting in Howard (Table 3). C&O, FAAS, Frederick, and Howard reported Gray Catbird sightings. Another rare sighting in winter, Brown Thrasher was reported in C&O, FAAS, Howard, and Kent.

Similar to last year, Canada Geese were the most numerous species reported totaling 28,662 individuals. Snow Geese were observed only in Kent this year (2,281), which is a decrease compared to 2021 (3,540). Frederick reported an unusual sighting of 2 Swan Geese (domestic type), presumed to have escaped from captivity. Using National Audubon Christmas Bird Count guidelines (J.B. Churchill and Geoff LeBaron, in litt., 10 and 12 July 2022), the 2 Swan Geese are included in the total number of birds but are not included in the total number of species. Significantly more Green-winged Teals were observed this year (65) compared to none in 2021.

The most numerous raptor reported was Red-tailed Hawk (285) followed closely by Red-shouldered Hawk (280). Four species of owls were present; the most numerous were Barred Owl and Great Horned Owl. Belted Kingfishers were observed in all count areas except for FAAS.

Six of the seven expected woodpecker species for C&O were observed in record numbers exceeding records established in 2018, the sole exception being Red-headed. James Speicher states, "the Emerald Ash Borer's [*Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae)] decimation of ash trees [*Fraxinus* L. spp. (Oleaceae)] in Maryland has been a boon for the family Picidae."

Compared to 2021, winter passerine numbers increased significantly even accounting for absent irruptive species. Across all count areas, 8,346 White-throated Sparrow observations were made which is a large increase from 6,992 last year. Dark-eyed Juncos showed a large increase in 2021 (3,497) compared to 2020 (2,669); the numbers remained similar this year (3,217). Only 3 Purple Finches were reported, 2 in C&O and 1 in Frederick. The number of Red-breasted Nuthatch decreased from 46 in 2021 to 10 in 2022. No Evening Grosbeaks were reported this year.

Table 3. 2022 Maryland Mid-winter Bird Count: Observed species.

Species	C&O	FAAS	ACAS	FR	CA	HO	KE	Total
Snow Goose							2,281	2,281
Swan Goose (domestic type) *				2				2
Greater White-fronted Goose				4			1	5
Cackling Goose							3	3
Canada Goose	2,783	1	65	6,917	2,280	7,496	9,120	28,662
domestic goose sp.	1							1
Mute Swan				1				1
Tundra Swan				28			82	110
Wood Duck	4					2		6
Northern Shoveler							100	100
Gadwall	9			20	15	3		47
American Wigeon	2					2		4
Mallard	600			254	167	428	208	1,657
Mallard (domestic type)	14			2				16
American Black Duck	149			31		32	2	214
Mallard x Am. Black Duck	2							2
Northern Pintail	4						3	7
Green-winged Teal				10		1	54	65
Canvasback							3	3
Redhead				1	110			111
Ring-necked Duck	164			56		91		311
Greater Scaup	5						75	80
Lesser Scaup	1			2		6	30	39
scaup sp.	1						100	101
Surf Scoter							5	5
Long-tailed Duck	2							2
Bufflehead	257				50	7	13	327
Common Goldeneye	89						3	92
Hooded Merganser	127				15	50		192
Common Merganser	600			101	73	604	62	1,440
Ruddy Duck						6	24	30
duck sp.	159			3				162
Wild Turkey	134		(feather)	43	4			181
Pied-billed Grebe	2					5		7
Horned Grebe	1							1
Rock Pigeon	223	13		758	149	104	28	1,275
Mourning Dove	72	3	1	605	180	262	18	1,141
Killdeer				2	2	1	1	6
Wilson's Snipe				1			3	4
shorebird sp.	2							2
Ring-billed Gull	288				8	153	17	466
Herring Gull	9					60	14	83
Great Black-backed Gull						1	3	4
gull sp.	15					5		20

Species	C&O	FAAS	ACAS	FR	CA	HO	KE	Total
Double-crested Cormorant							4	4
Great Blue Heron	26			11	8	11	17	73
Black Vulture	86	3	10	190	78	240	12	619
Turkey Vulture	83	3	8	345	124	323	74	960
Golden Eagle							1	1
Northern Harrier				7	2	4	1	14
Sharp-shinned Hawk	4			2	4	5		15
Cooper's Hawk	7	1	1	18	8	8	1	44
Accipiter sp.				1		1		2
Bald Eagle	82			19	13	27	10	151
Red-shouldered Hawk	63		1	107	37	70	2	280
Red-tailed Hawk	48	2	1	137	51	41	5	285
Buteo sp.	6			1		3		10
hawk sp.	2							2
Eastern Screech-Owl	3			7	1	1		12
Great Horned Owl		5		8	1	5	2	21
Barred Owl	8			8	3	6	3	28
Short-eared Owl				3				3
Belted Kingfisher	51		1	21	13	11	1	98
Red-headed Woodpecker	2	8		14				24
Red-bellied Woodpecker	608	18	6	283	87	223	24	1,249
Yellow-bellied Sapsucker	231	2	5	89	24	34	17	402
Downy Woodpecker	499	15	7	183	85	179	13	981
Hairy Woodpecker	89	3	2	27	19	23	5	168
Downy/Hairy Woodpecker	9			5				14
Northern Flicker	221	10	11	104	39	127	36	548
Pileated Woodpecker	218	2	2	31	13	34	7	307
woodpecker sp.	12							12
American Kestrel	2			19	9	5		35
Merlin		1		3	2	2		8
Peregrine Falcon	2					1		3
Eastern Phoebe	20			6		6	1	33
Blue Jay	241	20	3	371	89	206	51	981
American Crow	840	5	5	647	1,080	955	1	3,533
Fish Crow	92	2		7	21	367		489
crow sp.	124			29		1,089		1,242
Common Raven	66		1	35	5	25		132
Carolina Chickadee	710	19	4	257	94	215	15	1,314
Black-capped Chickadee	73							73
Carolina/Bl.-cap. Chickadee	16							16
Tufted Titmouse	547	14	3	226	83	273	17	1,163
Horned Lark	2			52	10	11	52	127
Ruby-crowned Kinglet	56		2	12		5	6	81
Golden-crowned Kinglet	161	3	2	19	20	18	2	225
Cedar Waxwing	226	6	4	142	45	186	12	621
Red-breasted Nuthatch	1			1	3	3	2	10
White-breasted Nuthatch	486	14	4	139	75	196	4	918

Species	C&O	FAAS	ACAS	FR	CA	HO	KE	Total
Brown Creeper	88	3	1	13	10	14	4	133
House Wren					2	1		3
Winter Wren	69			14	10	13	1	107
Carolina Wren	762	14	11	214	70	211	41	1,323
wren sp.	8							8
Gray Catbird	2	1		1		2		6
Brown Thrasher	1	1				1	4	7
Northern Mockingbird	34	8	4	132	50	124	30	382
European Starling	1,614	829	45	7,142	1,650	2,116	1,339	14,735
Eastern Bluebird	577	22	3	278	197	519	22	1,618
Hermit Thrush	63	11	6	24	11	25	12	152
American Robin	1,649	106	3	2,142	815	650	341	5,706
House Sparrow	163			594	164	400	56	1,377
American Pipit	1			1		1	4	7
House Finch	65	15	9	278	114	249	17	747
Purple Finch	2			1				3
American Goldfinch	122	5	12	166	86	153	7	551
Chipping Sparrow	(cd **)	5		39	6	7		57
Field Sparrow	19	24	1	17	48	49	2	160
Fox Sparrow		4	3	4	1	15	10	37
American Tree Sparrow	2	1		2				5
Dark-eyed Junco	546	25	5	1,144	624	777	96	3,217
White-crowned Sparrow	3			36	6	16		61
White-throated Sparrow	2,810	131	104	1,813	712	2,050	816	8,436
Savannah Sparrow				29		38	7	74
Song Sparrow	425	39	18	379	203	585	68	1,717
Swamp Sparrow	17	3	2	19	10	29	7	87
Eastern Towhee	3	8	3	23	4	43	3	87
Eastern Meadowlark				30				30
Baltimore Oriole						1		1
Red-winged Blackbird	33	67		185	15	613	4,569	5,482
Brown-headed Cowbird	2			496	406	78	5	987
Common Grackle				600	25	1	1,697	2,323
blackbird sp.						10		10
Common Yellowthroat				1	1			2
Palm Warbler				1				1
Pine Warbler					1			1
Yellow-rumped Warbler	211	1		61		7	39	319
Northern Cardinal	834	36	27	839	344	667	99	2,846
Painted Bunting						1		1

* The two Swan Geese (domestic type) are presumed to have escaped from captivity. They are included in the total number of birds but are not included in the total number of species.

** The C&O Chipping Sparrow, found on the section between mileposts 10 & 11, was the lone Count Day (cd) species not otherwise recorded for the count. Count Day species are those not found within the official survey period window.

Maryland Birdlife 71(2):84–86

2022 Spring Raptor Migration at Fort Smallwood Park, Anne Arundel County, Maryland

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With a total of 12,309 migrant raptors in Spring 2022, the Fort Smallwood Park Hawkwatch enjoyed its fifth-highest season total since its inception. Unfortunately, that milestone was accompanied by the continuation of a long-term decline in migrant buteos. It should also be noted that Fort Smallwood Park was undergoing renovations and we were forced to start the season near the Park's playground. However, in early April we were able to move back to our traditional location along the eastern shoreline. The effect on the count is unclear, but our usual view of the migration over the open water from that shoreline was unavailable during the early part of the count. Table 1 below displays the counts for Spring 2022 for the most common raptor species along with respective changes relative to their 5-year and 10-year averages.

Table 1. 2022 Common raptor species. The 2022 count and 5-year and 10-year percentage changes.

	Black Vulture	Turkey Vulture	Osprey	Northern Harrier	Sharp-shinned Hawk	Cooper's Hawk	Bald Eagle	Mississippi Kite	Red-shouldered Hawk	Broad-winged Hawk	Red-tailed Hawk	American Kestrel	Merlin	Season Total
2022 Count	384	9,241	336	58	1,036	176	182	28	82	381	113	203	53	12,309
5-YR % Change	-6	+18	-31	+5	+5	-30	-11	+87	-57	-28	-45	+44	+4	+8
10-YR % Change	-9	+37	-25	-5	-6	-33	+1	+133	-56	-28	-45	-6	+8	+18

As the table shows, the season total of migrant raptors was 18% above the 10-year (2012–2021) average, while totals for Red-shouldered, Broad-winged, and Red-tailed Hawks were down by 56%, 28% and 45%, respectively. In fact, the Red-shouldered and Red-tailed Hawk totals were the second lowest in close to thirty years. The table also reveals that the large number of Turkey Vultures

(9,241) was the driving force behind the high season count, comprising 75% of the total. That number was the second highest season total for Turkey Vulture in count history. Note that Black Vulture, Osprey, Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, and American Kestrel numbers were all below their 10-year averages while Bald Eagle, Mississippi Kite, and Merlin numbers were above average. The 89 days and 500 hours of coverage were both modestly above average. However, when the 5-year (2017–2021) averages are examined, the Bald Eagle count was below average, perhaps signaling a nesting saturation of the species. Northern Harrier, Sharp-shinned Hawk, and American Kestrel counts, on the other hand, were above average, which could mean their long-terms declines are starting to turn around, rather than being an artifact of favorable winds or weather.

The first day of the spring season began on 21 February and was augmented by five more days of February coverage. The total of 89 migrants was a bit above average and Turkey Vultures predominated.

March followed suit with the Turkey Vulture count 35% above its 10-year average for the month, coupled with a 24% above average of total raptors counted. Bald Eagle was the only other species with a count above average for March. Additionally, 19 March was notable as a 1,000+ count day, with 90% of the 1,057 migrants being Turkey Vultures.

April also had an abundance of Turkey Vultures which was a major factor in the month's count being 24% above average. But this time, Northern Harrier, Sharp-shinned Hawk, and Merlin had above-average counts and American Kestrel nearly so. On 3 April, sightings delivered exactly 1,000 migrants and while 796 Turkey Vultures led the count, 100 American Kestrels were also tallied, the best daily count of kestrels for the season. Unexpectedly, 29 April was special due to the Swallow-tailed Kite that visited the hawkwatch; the species was last seen at the Park in 2018.

May's numbers went in the other direction and were 17% below average. Mississippi Kite, Bald Eagle, and Broad-winged Hawk were the only species with above average counts for May. All of the season's Mississippi Kites were observed in May and within a six-day period from 17 through 22 May. The 28 individuals represented the second-highest annual total ever.

June received six days of coverage and the monthly total was about average, with Turkey Vultures constituting the bulk of the 59 raptors. The season ended on 7 June.

In other raptor action, two new Osprey nesting platforms were erected off the northwestern shore of the Park. The first Ospreys, assumed returnees from last

year, started sprucing up their old inland nest site. Unfortunately, that nest blew down twice and it's believed the pair finally took up residence on one of the platforms. The second platform was also eventually occupied and both pairs successfully raised young.

Fort Smallwood Park is known for a bountiful migration of many species besides raptors. Some of the highlights from this year included a higher than usual number of Long-tailed Ducks and Little Blue Herons, a Sandhill Crane on 14 March, a first-year Iceland Gull on 10 April, an American Bittern on 13 April, a Seaside Sparrow on 1 May, a Sora (up close and personal) on 3–5 May, a Black-bellied Plover on 14 May, Brown Pelican on 19–20 May, and a Short-billed Dowitcher on 26 May. A pair of Blue-winged Teals stayed almost a month, 3–30 April. Also seen was a Common Raven on 3 March and 19 April. It is suspected that ravens are nesting in the area, but definitive evidence has been lacking.

The staff at Fort Smallwood Park continues to accommodate and provide support for our activities, and we are very grateful. The season's efforts are made possible by a core of regular observers and other experienced helpers—thanks to everyone!—namely, Sue Ricciardi, Chris Reed, Dan Walker, Lynn Davidson, Hal Wierenga, Ralph Geuder, Cindy Godwin, Fred Shaffer, Hugh Hoffman, Bob Rineer, Dave Mozurkewich, Cristians Rivas, Mark Nelson, John Hoffman, Wayne Klockner, Alan and Sue Young, Andy Smith, Jim Stasz, Jeff Uhlenburg, and Andy Francis.

As we finish up one season, we tend to look ahead to the next season and voice our hopes for more individuals of Species X, better looks at Species Y, and good photos of Species Z. Come visit the hawkwatch in Spring 2023 and help us realize our hopes!

Sharp-shinned Hawk
Adult; Fort Smallwood Park, 26 March 2022, photographed by Dan Walker.

Maryland Birdlife 71(2):87–88

2021 Maryland May Count: Corrigenda

The Carroll County data shown in the 2021 Maryland May Count (Veek 2022) are hereby revised (Table 2).

The Garrett County data shown in the 2021 Maryland May Count (Veek 2022) are hereby revised. The Garrett County "Winter Wren" value is reduced to 2 and the "Marsh Wren" value is increased to 1 (Table 4). Additionally, the "Total Winter Wren" value is reduced to 2 and the "Total Marsh Wren" value is increased to 53 (Table 5).

Table 2. 2021 Maryland May Count: Western and Central Maryland summary. [*Carroll County corrected values*]

	CA
Parties	18
Observers	28
Start Time	0545
Stop Time	2245
Driving	
hours	25.9
miles	280.25
Walking	
hours	43.27
miles	42.17
Other	
hours	
miles	
Owling	
hours	1
miles	0.5
Stationary	
hours	26.4
Total Species	128
Total Individuals	5,196

Table 4. 2021 Maryland May Count: Western and Central Maryland observed species. [*Garrett County corrected values*]

Species	GA	AL	WA	FR	MO	CA	HO	BA	PG	AA
House Wren	39	13	23	123	8	41	112	47	3	10
Winter Wren	2									
Sedge Wren							1			
Marsh Wren	1							5	5	10
Carolina Wren	15	40	63	194	25	68	260	100	165	136

Table 5. 2021 Maryland May Count: Southern Maryland, Eastern Shore, and total observed species. [*Total corrected values*]

Species	CH	CT	SM	KE	TA	DO	CN	WI	WO	SO	Totals
House Wren	2	3	5	2	4	22	5	10	2	10	484
Winter Wren											2
Sedge Wren		1									2
Marsh Wren		7				12		5		8	53
Carolina Wren	130	175	95	64	58	147	89	88	32	41	1985

LITERATURE CITED

Veek, M.E. 2022. 2021 Maryland May Count. *Maryland Birdlife* 71(1):31–44.

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